GUY'S HOSPITAL

REPORTS.

EDITED BY

SAMUEL WILKS, M.D.

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FOURTH REPORT

OF THE

GUY'S HOSPITAL LYING-IN CHARITY.

From OCTOBER 1, 1854, to SEPTEMBER 30, 1863.

COLLATED FROM THE RECORDS

By J. BRAXTON HICKS.

PRESENTED

By H. OLDHAM, M.D., and J. BRAXTON HICKS, M.D., F.R.S.

INTRODUCTION.

This the fourth report of the Guy's Hospital Lying-in Charity, it will be observed, embraces a period of nine years; being three years longer than each of the former reports.

Although this is drawn up upon nearly the same plan as the others, yet it will be found that some slight alterations have been made.

In the first place, we have omitted the table of the number of monthly and yearly deliveries (see 'Guy's Hospital Reports,' 1856), as possessing no practical use nor accurate basis for computation. The number attended in each month or year is not only influenced by the extent of area attended by us (which varies at pleasure), but also by the changing character of its population.

In the second place, we have given the cases more in detail. Those who have had much to do with the practical value of statistics will we think fully concur with us

in acknowledging the difficulty which exists in placing a number of facts in such a manner so as to be really useful; and this remark applies particularly to medical statistics of every section. Every one is aware that seldom a case occurs without some complication which alters more or less its whole features, and materially interferes with the value of deductions made therefrom.

If therefore these are not duly allowed for, then our conclusions will be vitiated in proportion as we are careless in attending to the complications. For instance, if under the head of " version " we seek the results to the mothers after that operation, we find in the present report that out of 71 cases, four have died. Were we content with this result, we should unjustly bring against the operation a very grave charge, whereas by inquiring further we find that flooding occurred in all the four; that three of these died from the hæmorrhage, and the fourth from placenta previa and subsequent pyæmia. Again, should we in " placenta previa" wish to know the result of the various modes of operations on the infant life, and should be content with the number of deaths under each, we should arrive at very incorrect conclusions, unless we were first to inquire how many children were dead before the operation was begun, what the state of the uterus, the state of labour, &c. The same remarks obtain in every variety of labour, and it is for this reason that, while we have in numbers broadly stated the results to mother and child, we have given a concise detail of every case as far as the records have permitted us; and where the features of a case, or its treatment, have been complicated, they are referred to under the different appropriate heads. To the reports themselves, therefore, rather than to the figures, we would refer those who wish to draw conclusions on any question of practice.

At the same time it must be borne in mind that the reports are the results of out-door practice, and drawn up by various hands, and this must be an apology for any imperfections which must in the nature of things follow. Still we feel that, so far as they go, they may be relied upon for accuracy. The total number of cases attended by the charity is really greater than stated. As many as 2000 cards are issued per annum on the average, 1600 in round numbers on the average are returned; the remainder

are probably to be accounted for in the following manners :— A portion is kept by patients who have obtained cards from three or four similar institutions, to secure one out of the number, only one of whose cards they use ; another portion is retained by patients who move out of the district ; and a third is retained by the gentlemen who have attended. The number of the latter it is difficult to estimate, probably about 60 or 70. It is necessary to bear this in mind, because it is a fair balance to any case of death which might occasionally occur, after passing out of our hands. These, though rare, possibly do occur (perhaps once in two or three years), and they are sufficiently balanced by the above omissions. In computing also the relative mortality of our cases with those of in-door* charities, it must be remembered that our patients continue for a longer period under supervision in our charity, because we find that they send up for assistance, or seek admission into the Hospital after the ordinary term of attendance has expired. Thus in one of the cases recorded as fatal, death occurred three months after ; this case would have been excluded in many records. But as our desire is to present an honest rather than a flattering report, we have entered all the facts which are to be considered as results of the act of delivery as far as known to us.

Still we may with some satisfaction call attention to the death-rate of the present report, being rather more than $2\frac{3}{4}$ per thousand, or 1 in 340, from all causes whatever. The death-rate of the former twenty-one years was 1 in 140.

This improved rate is much owing to the diminution of "puerperal fever," particularly of the toxæmic varieties. In the present report we have less than one case in 1000, while in twenty-one years' report it was one in 234 cases.

No doubt much of this result has been obtained by the attention paid to separating the attendant from other cases, whenever these diseases threaten.

The satisfactory results thus obtained have been owing much to the assiduity and attention of gentlemen in attendance, as also to the resident obstetric clerks under whose more immediate supervision the cases are managed.

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* It should be noted that this charity is an out-of-door, not an in-door one, as many continental writers and others in this country, who have done the honour of referring to these reports, have supposed.

THE FOURTH REPORT OF THE LYING-IN CHARITY,

Embracing a period of Nine Years, from October, 1854, *to end of September,* 1863.

The total number of women attended for the ten years of whom record is preserved, is 14,871.

The total number of children born is 14,999. Of these, 14,376, or 95·6 per cent., were born alive; 623, or 4·6 per cent. stillborn.

In 14,962 of whom the sex is mentioned, 7825 were males, 7137 were females, or as 100 to 91.

TABLE I

Of Presentations under which the Living *Children were Born.*

Males, 7476 = 52·00 per cent.   Females, 6899 = 47·99 per cent.   Total, 14,375.

	Males.		Females.		Total. Per cent.
Vertex .	Full term 7305 } Premature 18 }	7323	Full term 6728 } Premature 16 }	6744	14,067 = 97·8
Vertex and funis . . .	6		. . .	0	6 = ·04
Vertex and hand . . .	7		. . .	6	13 = ·09
Transverse and varieties . .	8		. . .	8	16 = ·11
Pelvic and podalic { Full term 102 } Premature 1 }		103	Full term 144 } Premature 2 }	116	219 = 1·5
Funis (conditions not mentioned)	4		. . .	3	7 = ·05
Face	25		. . .	22	47 = ·32
Total . . .		7476	Total . .	6899	14,375

TABLE II

Shows the Presentations under which the 623 Stillborn *Children were delivered.*

Of whom mention is made in 587, 347 were males, 238 were females, or as 1 to ·67.

	Males.		Females.		Total. Per cent.
Vertex .	Full term 225 } Premature 33 }	258	Full term 141 } Premature 21 }	162	420 = 67·0
Transverse and varieties .	Full term 16 } Premature 1 }	17	Full term 16 } Premature 3 }	19	36 = 5·7
Podalic and pelvic .	Full term 60 } Premature 14 }	74	Full term 43 } Premature 11 }	54	128 = 20·0
Face		0	. . . .	3	3

Sex not mentioned.

									Total.
Funis	.	Cephalic . . 21				.	.	.	30
		Transverse . . 5							
		Podalic and pelvic . 4							
Uncertain .	.	.	.	.	.	.	.	.	6

It is worthy of observation that the proportions in the first table coincide almost exactly with Table III of the report for the twenty-one years in 'Guy's Hospital Reports' for 1850. With regard to the general death rate in the children, there is an improvement. Whereas in the twenty-one years it was 5·2 per cent., in the present it is only 4·6; though in regard to the last seven years of that period it is nearly the same, the latter being 4·73. To attempt to rigidly determine the advantage of any plan by the death rate would be full of fallacy, unless it could as rigidly be ascertained whether the child, in any case, were already dead; and whether the child, even if it were, did not die in consequence of some unavoidable condition or complication of labour. For instance, if in a case of convulsions the child were turned, and born dead, this in some tables would be quoted against the advantages of version; whereas it is quite as probable, or more so, that the child was already dead. The same may be said of placenta prævia, wherein also the risk to the child's life is so great from the antecedent flooding, that it is nearly as likely as not that the child was dead before the operation was commenced.

It cannot, however, fail to be noted that the funic presentation has been very fatal—7 out of 37 cases, or less than one fifth only, being born alive. Part of this result is probably owing to want of prompt relief in a maternity attended by numerous beginners; but, doubtless, in part to the tendency of the funis to present itself where the fœtus is dead before commencement of labour.

We would call attention to the small mortality of face presentation, and to the fact that nearly all were delivered by natural powers. (See section Face Presentation, p. 11.)

The number of vertex presentations is 14,527, or 96 per cent. The proportion of still-born males to the females delivered by the vertex is as 1 to ·6, or rather more than half; whereas the proportion of living males delivered also by vertex

to the females under same conditions is as 1 to ·9, or nearly equal. A considerable number of these cases occurred in primiparæ, but in any case there seems to be a large preponderance of dead males over females delivered by vertex, especially when compared with the relative proportions in the podalic presentations of the stillborn, which are as 7 in the males to 5 in the females. Of course, there is in all these calculations a small allowance made between the constant excess of males born over the females in the proportion of 100 to 91.

The pelvic and podalic presentations are taken together, because it has been found impossible to separate them in the reports, the breech generally being converted into a foot presentation, but no statement made at what time it was changed. Taking all these together, it will be observed that the children were born alive in the proportion of 2·5 to 1 born dead.

Premature Births.

	LIVING.				DEAD.	
	Males.	Females.			Males.	Females.
Cephalic Presentation	18	16	.	.	33	21
Pelvic or Podalic	1	2	.	.	15	10
Transverse	0	0	.	.	1	3

The total of males born alive, 19; dead, 49. Females, born alive, 18; dead, 34.

The proportion of living to those dead is therefore, total living, 37; dead, 83.

It is impossible from the reports to know whether the children were already dead before the setting in of labour, or whether they died in the birth. It is also unable to be stated whether the preponderance of deaths in podalic presentation was owing to the presentation, or whether the dead fœtus had a tendency to assume that position, or was so changed in the progress of labour. From the great excess in the death rate of cephalic presentations, it may fairly be assumed that a considerable proportion of the children died before labour set in.

Cases of Induction of Premature Labour.

Eleven cases only of this operation are recorded. They contain all the deaths, but not all the cases in which induced labour was had recourse to. The histories of some are imperfect.

Out of these, 6 of the children died, 5 were born alive. One of the mothers died. The reason for the performance of the operation was the same in all; namely, contraction of the bony passages. The modes adopted will be seen in the report of each case.

CASE 1.——Reason not stated. At fifth month, by puncture of membranes. Mother did well; but the child, a male, was dead-born.

CASE 2.——Reason not stated. At seventh month; child born alive. Mother recovered. Mode of operating not stated.

CASE 3.——Reason not stated. At seventh month; male child; foot presentation; dead-born. Mother recovered.

CASE 4.——Instrumental labours in all former confinements. Eleventh pregnancy, (probably) induced by puncture. Breech presentation. Child lived; mother recovered.

CASE 5.——Two former labours difficult; in third, pregnancy at seven and a half months. Small woman; tolerably good figure. Membranes punctured. Labour set in three or four days later, indecisively. Head presenting at first, but afterwards shoulder was forced down, and ultimately the arm: the child by this time was dead. By the time she was seen the pains had nearly ceased; pulse 110; tongue furred; the powers exhausted. Child had been forced down very low in pelvis. From the great promontory of the sacrum and continuous action of the uterus, which had again become irritable under the pressure of the hand, much difficulty was experienced in turning, which was assisted by the blunt hook. The placenta was adherent, and had to be removed; the uterus irregular in form, but no hæmorrhage followed. Version was done under chloroform. The patient went on pretty well for two days, when irritative fever set in, with scanty lochiæ. On the third day considerable hæmorrhage came on, which, in her state, soon proved fatal. The autopsy showed that the uterine surface where the placenta was attached had a sloughy look, and also a small sloughy patch on posterior lip of uterus, where probably

the long-continued pressure had been exerted during labour. From this the bleeding had apparently occurred. The uterine and neighbouring veins were full of pus. The pelvis was oblique, as was noticed during delivery; the antero-posterior diameter rather under three inches. It was not ascertained whether it was a case of Nägele's distortion.

CASE 6.—Perforation in former labour. At seven and a half months membranes were ruptured. The labour having come on but slightly the next day, galvanism was used, when the pains improved, and the day following the child was born dead, rather suddenly. Mother recovered.

CASE 7.—Version and perforation in first labour. In the second labour, delivery by the forceps; child dead. Antero-posterior diameter about three inches. Now at the seventh month of pregnancy. Labour in this pregnancy induced by sponge-tent, which, though it did not remain in long nor dilate much, produced labour pains in twenty-nine hours, so that at the end of eight hours after this the os was the size of a five-shilling piece. The membranes soon after this ruptured, and the presentation shortly after changed from cephalic to back of thorax. *Cephalic version* was performed by Dr. Hicks, the hand outside pressing the head down to the cervix, while two fingers through the cervix guided the head into it. The funis became prolapsed; it was pushed up above the head, and by pressing the head firmly into the os the funis was retained. After a while the outer hand was removed, and the child remained fixed as in an ordinary case of head presentation. The pains were very feeble, and the patient languid. Secale was given without satisfactory result. After waiting four hours, forceps were applied by Mr. Cann, the obstetric clerk, and the child born *alive*. The rest of the labour natural. (See 'Obstetrical Transactions,' vol. v, p. 249.)

CASE 8.—Coarctation of the brim; about $2\frac{1}{2}$ inches antero-posterior diameter. Former deliveries very difficult; children still-born. Fourth pregnancy. Membranes were ruptured twenty-four hours after labour began; the os was the size of a half-crown, moderately dilated, but would only admit two fingers. The shoulder was found to present. Chloroform was given, and version in this state was performed by the bimanual method, but principally by the external hand; one foot was

brought into vagina, slight pains assisting. Half an hour was given to allow the pains to come on again, (for they had been suspended by the chloroform,) and to allow the expansion of the os. The funis then became prolapsed, and its pulsations being feeble, the child was drawn down; but the contracted antero-posterior diameter detained the head so long, that life was lost. It was with much difficulty the head was brought through. She recovered without a bad symptom.

Case 9.—Æt. 25; short person; three children; craniotomy with all; pelvis small; sacral promontory not very prominent. Labour induced by first puncturing membranes and then dilating the os with india-rubber bags, which was done very easily; in about three hours it was fully dilated; slight pains continued for twelve hours, when they became stronger, and in a very short time the child was born, alive and vigorous. The placenta was not thrown off quickly, it was detached by the hand. She did well.

Case 10.—Multipara. Three very difficult confinements; remainder induced at seventh month.; two of them lived, rest died from transverse presentation. Four or five ounces tepid water injected between membranes and uterus, which remained within; it gave a little uneasiness for a moment, but no labour pains coming on for two days, the os was dilated by india-rubber bags with much ease, to full size; no pains occurred for a day and a half; secale was given to the third dose, when pains came on, and the child expelled very rapidly, alive. Both did very well.

Case 11.—Multipara; seventh month of pregnancy; whole pelvis juvenile. Rickety. Antero-posterior diameter of brim two inches; promontory of sacrum very low down. Labour induced by separating the membranes with a catheter. Labour began in ten hours, and went on slowly for twenty-four hours, when the os was fully dilated, membranes were ruptured, and the elbow presented; uterus then became very irritable, and rendered version exceedingly difficult. Version after the manner of spontaneous evolution was attempted by a blunt hook on the abdomen, without success; it was ultimately effected by seizing a leg with the hand. Child dead. Mother recovered. Chloroform was given, but did not much mitigate the force of the pains.

Complex Labours

The number of plural births is 116, or 0·78 per cent. of the whole.

Twin Cases.

Of twin cases there were 113, or about 1 in 129 of the whole number of women delivered, or about 0·88 per cent. The relations of the sexes will be seen in the tables.

No. of Cases.	Both Males.	Both Females.	One of each.
113	38	17	58
			Presentations.
Vertex in both			. 58
Vertex and nates, or foot			. 41
Vertex and transverse . .			. 6
Foot in both			. 1
Breech in both			. 1
Foot and breech . . .			. 3
Breech and transverse . .			. 2

Twenty-seven of the 226 children were stillborn.

In the transverse presentations version was adopted, and are entered in the statistics of "version." In two cases convulsions occurred. In one the placenta was expelled before the birth of the second child, which died.

There is no strict account of the time which elapsed between the birth of the children, but the longest time recorded is thirty-six hours.

It is curious to observe that although in the previous septennial years' report fifteen cases were complicated with placenta prævia, there is no account of any such coincidence during the last nine years.

Triplet Cases.

CASE 1.—One vertex ; two foot. All living.

CASE 2.—All vertex ; one male, two female. One hour elapsed between each child. One single and one double placenta. Hæmorrhage after last child.

CASE 3.—Two breech ; one vertex. All females. Two living, one born dead.

Face Presentations.

Fifty cases occurred, of which 46 were born alive; 25 males, 21 females. Those dead were females. All were delivered by natural efforts, except one, which was born alive by the assistance of the forceps.

Funis Presentations.

The total number of cases in which the funis presented was 43, or ·28 per cent., of which 13 were living and 30 were born dead.

Of the *living*, 6 occurred with vertex presentations, of the other 7 no mention is made. In all probability they also presented by the head.

Of the 30 *dead* born, as already shown, 21 occurred with cephalic, 5 with transverse, and 4 with podalic or pelvic presentations.

Version was adopted in 17 cases, and was successful in delivering living children in 7. All these were transverse presentations, in 2 of which cephalic version was employed.

Accidental Hæmorrhage.

There were 21 cases recorded where flooding (independent of placental presentation) occurred before labour to an extent worthy of notice. Doubtless others occurred in a minor form. Three of the mothers died. In one of these the hæmorrhage was concealed. In another transfusion was employed with temporary benefit. In one who died before delivery, post-mortem Cæsarian section was performed, to recover the child; but it had been dead some little time. In about half the cases the child was dead, in some of the cases the labour was premature; and mention seldom is made whether the child died before or during delivery; it is therefore impossible to draw any correct inference as to risk to the child in this complication.

Regarding the treatment by rupture of membranes, it is only mentioned to have been employed in five cases. In all the bleeding ceased upon its use.

The most noteworthy cases are recorded below.

Case 1.—Vertex presentation, eighth month of pregnancy. Taken suddenly with severe flooding, which continued more or less for eleven hours, os uteri being most of the time at less than a crown-piece, but one hour before delivery it rapidly dilated ; large quantities of brandy, opium, and ammonia were incessantly administered ; cold enemata used, as also some of a stimulating character. The pulse several times during this period was not to be felt. The child was stillborn ; the placenta following immediately ; no post-partum hæmorrhage. The patient lived, but improved very slowly till the 12th day, when she had an attack of phlegmasia dolens, from which she recovered. She was still very weak at the closing of the report.

Case 2.—This was a case of both accidental and post-partum hæmorrhage. A. G—, æt. 30, feeble woman, half starved, third pregnancy, full term, bleeding with each pain at beginning of labour ; this ceased for a few hours, and returned. Membranes were ruptured ; hæmorrhage ceased : child born in five hours after ; head presented. Placenta soon after expelled : violent hæmorrhage occurred immediately, from relaxation of uterus. Cold injections caused it to contract again, but it continued alternately relaxing and contracting with hæmorrhage ; cold injections into rectum and vagina were tried, but she went to a very low ebb, when the bleeding ceased, the uterus remaining contracted. Stimulants and nourishments were given, and she gradually rallied, and recovered under usual treatment.

Case 3.—Æt. 34.—Tenth confinement ; hæmorrhage concealed ; vertex presentation. The woman died next day. The uterus had been so distended at fundus that cracks had occurred in the peritoneal investment. This case is fully reported in ' Obstetrical Transactions,' vol. ii, p. 90.

Case 4.—Multipara. Severe hæmorrhage in all her former confinements ; had been in labour a few hours when flooding occurred, which depressed her greatly. Os thick and rigid, placenta not presenting. The membranes were ruptured, no more bleeding, labour went on slowly ; ergot was given, and it was soon completed. Large clots followed ; both mother and child did well.

Case 5.—Æt. 28.—Seventh pregnancy ; a drunkard. Being violently drunken, she quarrelled with her husband, and struck her abdomen against a table. Immediately afterwards a most

violent hæmorrhage occurred, and she became blanched and pulseless. She was seen half an hour afterwards. The os uteri was quite small, without any sign of labour. The vagina was plugged at first, but shortly after the membranes were ruptured. By this time she was dying ; she lived only an hour after the blow. Cesarean section was performed immediately after death, but the child was found to be dead. It was very livid and rigid. The funic veins were engorged. The placenta was found separated to three fourths of its extent. A large quantity of blood was found between the placenta and uterus.

CASE 6.—Æt. 30 ; sixth confinement ; female child, dead. Nearly full term, in half starved state ; was taken, while laughing hysterically, with a gush of blood from vagina, probably two or three pints ; she became collapsed immediately and was seen half an hour after, somewhat rallied. Stimulants were given. Pulse then was 120 to 130. The os was then undilated ; no pains. The bleeding was but little after this. Everything was done to rally her, but she continued in about the same state for two hours, when slight pains arose, and the os began to dilate ; the pulse was then varying from 120 to 130 per minute, so feeble as to be indistinct, and she was very pale and cold, notwithstanding the abundance of stimulants given. The membranes were ruptured. For three or four hours she rallied slightly, as labour progressed, but by the time the parts were ready for delivery she began to flag more than ever, the pulse being more uncertain. It was held that any attempts to deliver at this time would have been very hazardous. Transfusion was therefore employed by Dr. Hicks before any such attempts were made. The blood was given by the husband, but he yielded a scant supply, being himself in very ill fed condition. However, the effect of the operation was such as to rally the pulse markedly, and also the strength of voice and muscular power. Fresh oozing came on, and it was determined to deliver upon the new strength the transfusion had given her. The forceps were first employed, but the flabby state of parts rendered it difficult to pass the blades between the head and uterus. Turning was adopted by the new method with great ease, and child delivered. There was but imperfect contraction after, but no particular blood-loss. She, however, began to show signs of sinking, and

she died within half an hour after delivery; transfusion having been reattempted, but the supply of blood failed.

CASE 7.—Æt. 42; fifteenth confinement. Child born alive. The hæmorrhage ceased on rupturing the membranes. Severe post-partum flooding occurred, but it was stopped on removing the placenta.

CASE 8.—Æt. 20; third confinement; hæmorrhage severe for two or three hours before delivery. It ceased on rupturing membranes.

Placenta Prævia.

Twenty-one cases occurred, or ·14 per cent. Deaths occurred in three cases, Nos. 8, 19, 21; one shortly after labour, from the excessive loss before being seen; the other two, who had lost excessively, died from some form of toxæmia some days after.

In all the three cases version had been effected. In the one who died from the previous flooding the bimanual method was employed; in another there was great difficulty in bringing the head through the brim, after internal version; in the other, also delivered by internal version, adherent placenta added to the difficulties.

In 15 cases where mention is made, in 9 the child was born dead, and 6 living; of these 1 died from impaction of head in brim after version. In 5, as far as can be ascertained, the child was dead prior to version; in the others no mention is made whether the child died before or during version.

As the blood-loss is in part borne by the child in some cases of placenta prævia (which may be known from the exsanguine state of the fœtus), its fate is often sealed before the patient is seen. With regard to the influence of the extent the placenta spreads over the os upon the amount of hæmorrhage, the following list will show the uncertainty, though it must be recollected that the relation of the placenta to the uterus is not the same when first seen as it was when the bleeding took place, the os having dilated after, or probably at the time; a placenta at an early stage might be wholly over the os, when at a later it might recede to the edge of os after its liberation.

Position of Placenta to Uterus					Amount of Hæmorrhage Recorded.
Partially	.	.	.	.	Slight.
,,	.	.	.	.	Moderate.
,,	.	.	.	.	Severe.
,,	.	.	.	.	Considerable.
,,	.	.	.	.	Extreme.
,,	.	.	.	.	Severe.
,,	.	.	.	.	,,
Half-way	.	.	.	.	,,
At edge	.	.	.	.	Very severe.
Two thirds	.	.	.	.	Moderate.
Half .	.	.	.	.	Considerable.
One fourth	.	.	.	.	Severe.
Completely	.	.	.	.	Very severe.
,,	.	.	.	.	Severe.
,,	.	.	.	.	Moderate.

Neither from the reports can there be detected any relation between the amount of blood-loss and the term of pregnancy, nor does there seem to be any between the size of the os and the amount of blood-loss. It is of course difficult to find out what was the size of the os at the time of first bleeding, as before observed.

In those cases where mention is made, *version* was effected in 11 cases; of these 3 died. In 6 the membranes were ruptured, and some secale given, the cases terminating naturally; all these recovered. The favorable result attending the latter mode of treatment must not be taken in comparison with those treated by version, because they are a much less formidable class of cases; while version is frequently had recourse to in cases of great severity and of threatening death.

CASE 1.—Weakly woman, æt. 36; nine children, six of which were stillborn; suffered from hæmorrhage at each confinement, chiefly before delivery; was at her seventh month of pregnancy seized with violent flooding, without pains, the flooding occurred in gushes; the os uteri scarcely at all dilated. She was kept at rest for nineteen hours, when slight pains came on, with gushes of blood; seven hours after this the os was dilated to the size of a florin, and the placenta was felt presenting in part; eight hours after this the os was widely dilated, and the membranes protruded, but a violent flooding occurred, upon which the membranes were ruptured;

the breech presented, and delivery was effected in half an hour. A large clot of blood followed the extrusion of placenta; no further bleeding, and the patient made a good recovery, considering her loss. The child was dead.

CASE 2.—Æt. 39; fifteenth confinement. In her seventh month of pregnancy; had profuse hæmorrhages for five weeks previous, and also one just before seen. The placenta was found wholly stretching across the os uteri. The hand was passed between placenta and uterus; the membranes ruptured, a leg brought down, and a live child delivered; a good deal of flooding occurred during the operation and subsequently; it was, however, stopped by pressure and ergot. She recovered speedily, considering her loss.

CASE 3.—Æt. 40; tenth confinement; eight months pregnant. Lost a pint of blood some hours before seen; os high up, not dilated. After a time the placenta found to be partially presenting behind. Five hours after this the membranes broke, and a small stillborn child expelled, the placenta following with some hæmorrhage. She recovered rapidly.

CASE 4.—Æt. 36; seventh confinement. Breech presented; slight hæmorrhage. Placenta partially presenting, membranes were ruptured and ergot given. Child born dead in four hours. Recovered.

CASE 5.—Æt. 30; eighth confinement. Pale, thin woman. During three weeks before labour lost blood three times. Had been in labour thirty-six hours when first seen; os uteri was then fully dilated, placenta covering it entirely. The hand was passed between uterus and placenta, a leg seized, the child turned and rapidly delivered, alive. Mother did well.

CASE 6.—Æt. 24; second confinement. Partial placenta prævia. Delivered by natural efforts as an ordinary case. No further hæmorrhage ensued.

CASE 7.—Æt. 40; ninth confinement. In eighth month of pregnancy; gushes and clots of blood flowing for a fortnight previously. Placenta two thirds over membranes, already ruptured. No pains; os uteri partially dilated; very irritable, contracting tightly on slightest touch, admitting only two fingers at most. As the bleeding continued, version was accomplished by bimanual method, the leg brought through the os, and retained there by gentle traction; gradually the os ex-

panded, and in three to four hours' time it relaxed, and the child with placenta was expelled. No hæmorrhage had occurred from commencement of turning. Child dead some time before. Mother did very well.

CASE 8.—Æt. 26; eighth confinement. Eight months and one week gone in pregnancy. Very profuse hæmorrhage some hours before seen. Attendant found the patient blanched, cold, lying before the fire. Continuous oozing for seven hours, at the end of which time her voice was strong; pulse still not so weak as might have been expected; os uteri only admitting a finger. Two hours later much more collapse, pulse scarcely perceptible; voice still strong; no pains; os more dilated; placenta at edge of os uteri. Stimulants were given very freely, and version by combined method effected. The foot was brought into the vagina, and gentle, continuous traction used, by which means the child formed an efficient plug. Stimulants freely given, and one dose of ergot. She continued much collapsed, though the voice was strong. The uterus now began to act, and in about half an hour the child was born. The uterus contracted well. No hæmorrhage occurred after the commencement of turning. Stimulants and warmth were ordered, but she continued to sink, and died about an hour afterwards, without further loss. Child dead.

CASE 9.—Much hæmorrhage at commencement of labour; membranes were ruptured; secale given. Labour terminated in twenty-four hours without further hæmorrhage. Recovered.

CASE 10.—Æt. 20; first confinement. Vertex presentation. Full time. Severe flooding one month before, and continued at intervals up to full time; it increased in first stage of labour, afterwards labour proceeded naturally. No post-partum flooding. Irritative fever succeeded, but she recovered slowly. Placenta was partially over os.

CASE 11.—Æt. 28; sixth confinement. Full time. Some weeks before flooding occurred, which returned several times up to the labour. Was suddenly seized with flooding shortly before being seen, when the os uteri was the size of a shilling; placenta half way over the os. Twenty-four hours after, more hæmorrhage occurred, and again three days after that; the os being then dilatable, and liquor amnii not escaped, version was performed. A dose of ergot was given, and nature allowed to

complete the labour, which happened in two hours. The child was dead, but alive shortly before. Mother recovered.

Case 12.—Æt. 22 ; third confinement. In last month of pregnancy. Irregular bleedings for two or three weeks, but just before being seen a considerable loss had occurred. Pains had begun three hours. Pulse quick and feeble ; os uteri size of a crown, soft but not yielding, admitting only two fingers. Placenta three quarters across the os uteri. Bleeding still continuing freely, combined version was performed, one leg at first brought through ; the other was afterwards brought down, as it interfered with the perfect pressure of the child on the bleeding parts. Slight traction was kept up. Uterine pains came on in three quarters of an hour, and a living child expelled by natural pains. The placenta being retained, and hæmorrhage supervening, it was removed. Patient did well.

Case 13.—Æt. 29 ; sixth confinement. Had much hæmorrhage before version, which was performed with ease. The child was stillborn. The rest of the case natural.

Case 14.— Æt. 36 ; fifth confinement. Twenty-four hours before had lost a large quantity of blood, and again just before being seen. The os partially dilated ; placenta at edge ; membranes were ruptured, but as bleeding continued, version was effected and child delivered by old plan, with much difficulty, owing to the impaction of child's head at brim. The placenta came away well. Fourth day attacked with bronchitis, incontinence of urine, and phlegmasia dolens, and was taken into Guy's Hospital. She improved in these respects, but afterwards became paralysed in left side of face and died, rather rapidly, about the tenth day after delivery, in a low feverish state. No necropsy permitted. Child dead.

Case 15.—Primipara ; æt. 20. Full term. Twelve hours before visited had a very profuse flooding, and again shortly before seen, which blanched her. Pulse 120, very feeble ; had taken stimulants and food. Os fully dilated ; placenta tense and firm over the whole ; no membranes to be felt, the thickness apparently decreasing forwards. The hand was passed into os, and the placenta detached anteriorly, the membranes being found about two inches within the os. The membranes were ruptured partly within the edge of placenta. Head presented ; the foot was seized and brought down ; the head was

raised by the hand outside the fundus, which facilitated version very much; the breech was brought down and retained as a plug in os; stimulants and nourishment were given, and after an hour the child was born dead, by natural pains; there had been no internal bleeding. After waiting some time, the placenta was found to be firmly adherent, it was removed with some trouble, but without hæmorrhage; she was much exhausted by the process and previous loss. She went on pretty well till the third day, when she was seized with low feverishness intermitting in character, quick pulse, and died rapidly, with intense pain in side.

There was found complete effusion in left thorax, with flakes of lymph. There was a small quantity of lymph in pericardium, on one of the valves, and in peritoneum near uterus. Uterine vein filled with breaking-down clots; no pus; sloughy look of interior of uterus.

Retained placenta.

It is difficult to form an accurate estimate of the number of cases of retained placenta, inasmuch as cases are frequently so called by those who have not had much experience in midwifery, when the placenta is only retained in vagina, or caught by the cervix; still, as the following numbers related here had been seen by the resident obstetric clerks, probably a considerably larger sum than half might fairly be classed under this head.

105 cases are reported; of these 37 were attended with considerable hæmorrhage; 49 are characterised as "adherent." 12 were accompanied by hour-glass contractions, 5 of which gave rise to flooding. 2 deaths occurred—one case died from partially adherent and partly detached placenta. Transfusion was tried, but without success beyond a temporary improvement (see Post-partum hæmorrhage, Case 7). A Case also of flooding before placenta came away occurred, of great severity, which recovered (See Post-partum hæmorrhage, Case 1).

The other case is reported below. All the cases were treated by removal of the placenta by the hand; however, one is recorded under head of Post-partum hæmorrhage, Case 9, where secondary hæmorrhage ended fatally after

removal of placenta, and another where the uterus never contracted. (Case 2, Post-partum hæmorrhage.)

CASE 1.—M. S——, æt. 43 ; 11th confinement ; very desponding. Profuse hæmorrhage before labour. Child born alive. Hæmorrhage came on directly after the birth. The attendant endeavoured to take away the placenta. The funis broke, and the uterus contracting tightly, closed over it. The hand was then introduced in part and portion of the placenta seized, but the uterus again contracting, expelled the hand with this portion. A dose of opium was given, and the hand again introduced ; another portion of the placenta was then removed. Opium was continued, and cold water applied to the abdomen and pudenda, and the hæmorrhage was thus stopped. It was supposed by the clerk that all the placenta was away, and he left, but the patient died a few hours after. The placenta had been adherent in her last labour, when she barely escaped with her life.

On a post-mortem examination a considerable portion of the placenta was found adherent to the inside of the uterus. There did not appear to be any morbid change in either uterus or placenta.

Post-partum hæmorrhage.

As with retained placenta, so with this section ; it is difficult to say how many cases of decided character have occurred. To estimate the amount of blood which can be lost before it may be called " flooding " is difficult to those not versed in such matters. Still in the majority the bleeding was doubtless severe. 158 are recorded, which gives about 1 in 100, which is not an over estimate among a poor and enfeebled population. 18 occurred with adherent placenta, 11 with retained placenta, 5 with hour-glass contraction. In 7 the children were dead. The presentations were not beyond the usual average of abnormality. Two of the mothers died.

The following are the principal cases recorded :—

CASE 1.—Labour natural ; æt. 37 ; eighth confinement ; child born before attendant arrived. Placenta within uterus, funis still attached ; large flooding before seen. Pulse rapid and nearly imperceptible ; extremities cold ; could only speak in

a whisper. The cord was tied, and child removed at once. Tr. Op. half a drachm, with brandy, was given; the hand passed into uterus, and placenta detached; about half was found adherent or attached. Friction over the uterus was used and ergot given, and in two or three minutes the hand and placenta were expelled by action. The uterus then contracted firmly; no more blood was lost. Warmth was then applied to feet and legs. Stimulants continued, and the patient not moved for ten hours. Troublesome cough was present. However, under wine and generous diet she recovered steadily, and was able to sit up on the tenth day.

Case 2.—Æt. 45; thirteenth confinement; nervous and excitable woman. Labour natural. Uterus contracted well at first, but shortly afterwards hæmorrhage took place. Placenta was found in uterus quite detached, and was easily removed entire. Hæmorrhage, however, continued from relaxation of the uterus, notwithstanding the use of cold water externally, and to interior of uterus, pressure and three doses of ergot. Galvanism was tried; but nothing produced any contraction. She died two and a half hours after delivery.

She had been very weak from bronchitis for some time before labour, having scarcely left her bed for five months. From feeling the uterus through the abdominal walls, it was suspected that there was deposit in the walls. No post-mortem examination. Child was born dead.

Case 3.—Æt. 20; second confinement. Male child born alive; after a natural delivery, the uterus relaxed; severe hæmorrhage followed; cold and pressure were employed. The hand was then introduced within uterus to remove the clots. Bleeding ceased for a time, after which the uterus began again to fill. The same treatment was adopted, and the bleeding at last ceased. A little irritation set in, but she ultimately did well.

Case 4.—Another case, in which galvanism was employed, and was said to have arrested the bleeding.

Case 5.—Another case; flooding occurred after triplets, before placenta was expelled.

Case 6.—Very protracted labour. Very profuse hæmorrhage. She fainted from the amount lost, and then had a convulsion, but eventually she recovered.

CASE 7.—Adherent placenta; natural labour. *Transfusion.* Directly after birth of child very large quantity of blood was lost; pulse nearly gone. Collapse and coldness came on. The placenta was adherent, stimulants were given freely; and she rallied somewhat, but as oozing still continued, the placenta was removed without much difficulty, although it was firmly adherent at fundus. No bleeding occurred from it, nor afterwards, but she continued excessively weak, and after half an hour, the pulse being scarcely perceptible, transfusion was had recourse to, at first with benefit, but ultimately (in about half an hour) she sank. No more blood could be obtained from the husband. She had had much flooding before from adherent placenta, and nearly lost her life at the last confinement.

CASE 8.—Secondary hæmorrhage after natural labour. The uterus was emptied of the clots, and the flooding ceased. Patient did well.

CASE 9.—Æt. 36 ; lingering labour ; sixth confinement. Hard drinker; labour natural. Uterus imperfectly contracted, with slight hæmorrhage, which ceased on removing placenta. The attendant waited for an hour and a half, using compression and ergot. The hæmorrhage having ceased some time, and uterus firmly contracted, she was left. But in about half an hour she became faint after moving in bed, and shortly died. A post-mortem was not allowed, but it was ascertained by external examination that the uterus was largely distended.

Transverse presentations and its varieties.

The total number which occurred is 52. Of these 16 were born alive : 36 were stillborn. It occurred at the rate of ·34 per cent. of the whole number of presentations. It will be seen that less than half were born alive ; this, however, is not to be taken as proof of the fatality of the position, because many dead fœtuses became driven down into that state during labour. The proportion of this presentation among the stillborn will be best seen by the per centage, namely, 5·7.

The reports are principally to be found under the head of version, by which operation they were remedied. Those which

are here recorded were delivered by natural efforts, by spontaneous evolution.

CASE 1.—*Arm and funis presentation* ;—Delivery by spontaneous evolution.   The child was born dead, but the mother recovered.   (No further report.)

CASE 2.—*Arm* presentation ; second confinement ; premature.   It was delivered by spontaneous evolution *alive*.   The child was small—a male.   The mother's pelvis was capacious, and the uterine efforts very vigorous.

CASE 3.—*Hand* presentation.   At seventh month of pregnancy.   Æt. 30.   Eighth confinement.   Child extruded dead by spontaneous evolution.   Mother recovered.

CASE 4.—*Arm* presentation.   Primipara.   Æt. 21 ; at seven months and a half of pregnancy. Turning was attempted by three of the attendants, but from the irritability of the uterus, and of the patient's mind even under chloroform, it was found impossible ; while waiting for the physician the child was expelled, doubled up by natural powers.   It was uncertain if it was exactly after the manner of the " spontaneous evolution" of Denman.

Multiple presentations.

These are recorded under "version," by which operation they were rectified.   (See Cases 54—59, inclusive.)

Version.

Seventy-seven cases have been reported, or about 0·52 per cent.

Podalic version.—For rectifying transverse presentations and varieties .	46
„ „ multiple presentations .	5
In prolapse of funis with head presentation .	5
„ „ transverse .	12
In cephalic presentations for coarctation of brim .	⎫
after forceps in 2 cases .	⎬ 8
perforation in 1 case .	⎭
In sudden hæmorrhage in cephalic presentation .	2
In placenta previa, with cephalic presentation .	11
Cephalic version.—The transverse presentations with prolapse of funis ; children born alive .	2

The fate of the children is recorded in only 53. Of these, 15 were living, and 38 dead. Of the mothers, 6 died. If these are referred to, it will be seen that in all severe hæmorrhage occurred ; namely, one was a case of placenta prævia, followed by pyæmic pleuro-pneumonia ; one of placenta prævia, with extreme hæmorrhage ; one of placenta prævia, with impaction of head after turning, and subsequent paralysis ; one of very profuse flooding, in a case of twins before birth of second child, followed by peritonitis ; the fourth, of extreme hæmorrhage before labour, in which transfusion was resorted to. Thus but one of the deaths can be fairly attributed to the act of turning, the rest to the causes and complications requiring it.

In the following records the mode of version adopted is to be undestood to be the old plan, unless the contrary is mentioned.

Case 1.—*Arm.* Male; born dead. Mother recovered.

Case 2.—*Arm.* Twin female; living. Mother recovered (adherent placenta and hæmorrhage).

Case 3.—*Arm.* Female; living. Mother recovered.

Case 4.—*Arm.* Female; dead. Mother recovered.

Case 5.—*Arm.* Female; living. Mother recovered.

Case 6.—*Arm.* Male; dead. Mother recovered.—E. R—, æt. 27 ; good general health ; fifth pregnancy, at full time. Liquor amnii escaped at a very early period of labour ; twelve hours after, pains increased ; at which time it was found that the arm was protruding through the vulva, livid and swollen ; shoulder and chest wedged down into brim ; uterine contractions strong ; vagina hot, dry, and tender ; pulse 85 : condition otherwise natural. The bladder was emptied, chloroform administered, and version accomplished (with some difficulty, owing to the firm contraction of the uterus) by bringing down the right foot. The child was slightly decomposed ; the rest was natural. Mother recovered without a bad symptom.

Case 7.—*Arm.* Female child; living. Mother recovered.

Case 8.—*Arm.* Male ; living, with *funis* presentation. Mother recovered.

Case 9.—*Arm.* Premature, seventh month. Child decomposed. Mother's parts lax and moist ; version very easy. Mother recovered.

Case 10.—*Arm.* Female child; living. Mother recovered. S. B——, æt. 32, healthy. Multipara. Two hours after labour began the membranes ruptured; and two hours after this the presentation could not be made out, although the cervix was well dilated. There were scarcely any uterine pains. After twelve hours the labour was the same, but the child's shoulder presented. The patient being placed under chloroform, version was accomplished, and a dead child delivered. The rest natural. Mother did well.

Case 11.—*Arm.* Æt. 24; second confinement. Female child; dead. After the membranes ruptured, the head came down. By the time she was visited, the shoulder and part of the chest were wedged in the brim of the pelvis. The os was fully dilated. Child was delivered by turning, after some difficulty, on account of the strong uterine action and large size, and died after a few gasps. Artificial respiration, &c., unsuccessful. Mother recovered well.

Case 12.—*Arm.* Æt. 36; fifth labour. Female child. Left arm presenting when first seen; had been in labour, with membranes ruptured, twenty-four hours. The child was turned and delivered very easily. Rest natural. Did well.

Case 13.—*Arm* presentation. Female dead child. Mother recovered.

Case 14.—*Arm, with funis.* Male; living. Mother recovered.

Case 15.—*Arm, with funis.* A twin; living. Mother recovered.

Case 16.—*Arm.* Æt. 24; fifth confinement. Male; dead; evisceration. Mother recovered.

Case 17.—*Arm.* Æt. 20; second confinement. Male; dead. Mother recovered.

Case 18.—*Arm, with funis.* Æt. 32. Fourth confinement. Male; dead. Mother recovered.

Case 19.—*Arm.* Æt. 41; fifth confinement. Male; living; premature (seven and a half months). Mother recovered.

Case 20.—*Arm.* Æt. 30; fifth confinement. Female; living. Mother recovered.

Case 21.—*Arm.* Æt. 35; ninth confinement. Male; dead. Mother recovered.

Case 22.—*Arm.* Third confinement. Female; dead. Mother recovered.

Case 23.—*Arm.* Æt. 35; seventh confinement. Male (twin); living. Mother recovered.

Case 24.—*Arm.* Induced premature labour.

Case 25.—Æt. 32. Tenth confinement. Male; dead. *Arm presented* when first seen, with the funis outside; funis just pulsating. Pains very urgent. Chloroform given, and version effected in the usual way, slowly. Pains almost entirely suspended by the chloroform, which was omitted when the breech came through the os. The rest of the labour was natural, and the mother did well.

Case 26.—Æt. 20; third confinement. Male; dead. *Transverse presentation.* Version one hour after membranes had ruptured. No difficulty. Child dead. Mother did well.

Case 27.—*Arm presentation.* Æt. 39; twelfth confinement. Version in a former labour. Membranes ruptured three hours before; internal version without difficulty. Child born alive: both did well.

Case 28.—*Arm.* Æt. 31; second confinement. Female child; dead. Had been twenty-four hours in labour. Chloroform was given. The child was turned, by internal method, with considerable difficulty, owing to the active state of uterus. The mother did well, but child was dead.

Case 29.—*Arm.* Female child; dead. Had four children. Was in labour for thirty hours, when pains ceased. About seven hours after, felt something give way within, when the arm presented itself. When the attendant arrived, the arm was external. He, after some difficulty (from the contracted state of uterus, the liquor amnii having long before escaped), succeeded in turning the child and delivering. Much hæmorrhage took place before the placenta came away. It was removed, and the bleeding ceased. She recovered without a bad symptom.

Case 30.—*Shoulder presentation, with funis.* Child alive. Placenta retained by constriction of os uteri. Recovered.

Case 31.—*Hand presentation.* Æt. 28; second confinement. Child alive. Recovered.

Case 32.—*Arm.* Æt. 27; second confinement. Dead child; male. Twelve hours after pains began membranes

ruptured, and pains subsided for twelve hours. When they returned, the left hand was found in the vagina. Version was commenced without chloroform; but when the hand reached the hip, the uterus contracted so powerfully as to prevent further progress. Chloroform was then given, and the version readily completed. A dose of ergot was then given, and the patient recovered without a bad symptom. The child was decomposed.

Case 33.—*Hand.* Æt. 23; third confinement. Male child; dead. Three hours before attendant reached the place labour began, and the membranes had been ruptured an hour and a half. Hand was then found presenting, with funis close to it. Version was at once performed, without chloroform, and a dead fœtus of full size extracted. Uterus contracted slowly; patient recovered quickly and well.

Case 34.—*Hand presentation.* Æt. 36; eighth confinement. Female; born dead. Mother recovered.

Case 35.—*Hand and head.* Foot seized; the funis came down with it. Child born dead.

Case 36.—Æt. 27; seventh confinement. Child stillborn. *Left hand and funis* presented; membranes ruptured. Chloroform given. Turning by combined method. Mother did well. Patient had had version performed three times before, and craniotomy once.

Case 37.—*Hand, with funis.* Æt. 27; fourth confinement. Female child; living. Recovered.

Case 38.—*Arm.* Æt. 39; multipara. Twins. Delivered easily of the first child. The second presented by the arm: uterine pains active and frequent. The uterus surrounded the child closely; its thorax was partly jammed down into cavity of pelvis; the head high up towards fundus, as was the breech. The hand was passed up, the legs seized, and version completed without difficulty. The child was dead. Recovered well.

Case 39.—Æt. 28. First confinement. Female child; born dead. *Arm presentation, with funis.* Waters flow away some time; uterus very irritable; much difficulty in turning. Mother recovered.

Case 40.—*Transverse and Funis presentation — Cephalic version.*— Æt. 33; eighth confinement. Female child; living.

Transverse presentation : membranes perfect. After a short time membranes broke ; funis came down. Dr. Hicks replaced this by the hand above the head, which was pushed into the os with the outer hand, guided by the inner. The outer hand kept up the pressure for half an hour, when the funis was found retained, and in about an hour the labour was ended as in a natural case. The child was born alive.

CASE 41.—*Elbow*. Æt. 24 ; third confinement. Child dead. Labour had been on twenty-four hours, when the membranes ruptured. Elbow presented ; a knee was drawn down, and delivery effected in about an hour. Child asphyxiated. Mother did well.

CASE 42.—Induced premature labour, with *shoulder* presentation. (See Induced labours, Case 8.) Recovered.

CASE 43.—Induced premature labour, with *arm* presentation. (See Induced labours, Case 5.) Died.

CASE 44.—*Shoulder presentation* Æt. 22 ; second confinement ; female child born dead. Os fully dilated ; but uterus tightly contracted round shoulder, a short distance within. It was impossible to pass the hand by the constriction. Chloroform was given, and the moment it had produced its full effect, relaxation was complete, and version was accomplished with great ease. The head was detained at the brim, however, and this proved fatal to the child's life. Much traction was required to complete delivery. The patient did very well.

CASE 45.—*Head, with funis*. Female child. It was, however, born dead. The mother had metritis and peritonitis after, but ultimately recovered.

CASE 46.—*Head, with funis*. Male dead child. Recovered.

CASE 47.—*Shoulder presentation* followed by perforation. (See Craniotomy, Case 6.)

CASE 48. Æt. 25 ; first confinement ; male child. Case of abbreviated conjugate diameter, in which the child's head rested on the brim, without entry. The position of the head, which was with long axis antero-posterior, was altered to first position, without result. The child was then turned with the view to its more easy delivery by the breech, but when the shoulder had passed it was found that the head was detained at brim ; upon which the head was perforated behind the ear, after which

it passed through. The placenta was partially detached, and after the head was born, about one pint of blood came away. Uterus at first did not act readily, but ultimately it contracted well. Chloroform was given. There was some metritis after, and the milk was suppressed for two weeks when it returned, she did well in three weeks (see Craniotomy, Case 10).

CASE 49.—Æt. 25; third confinement. First labour very long; child stillborn; second born alive. Small, rickety woman. Had been in labour two days; the last ten hours in active labour; membranes ruptured some hours. Head above brim, not having entered it. Pains urgent, without result. She was becoming exhausted; pulse above 100, tongue dry and brown. Child alive. Judging from relation of the head to the pelvis, it was considered that the use of forceps would be attended with risk. An attempt was made to save the child by version. Chloroform was given, whereby the labour pains were moderated. Version was accomplished by external and internal method, but when the head came upon the brim, it was found impossible to draw it through. A perforation was made behind the ear, without any result, then through the roof of the mouth. Traction upon the body failed, but by introducing a small blunt hook into the opening behind the ear, and thereby altering the position of the skull, it was immediately delivered by moderate traction; many clots succeeded, but uterus contracted well, and patient recovered. The head of the child was found to be exceedingly ossified; fontanelles obliterated. Sacral promontory of mother projected considerably forward. Mother recovered (see Cranitomy, Case 9).

CASE 50.—Æt. 32. Second confinement; male dead child. Twelve hours in labour; strong ineffectual pains; tongue became furred, and she was exhausted; membranes had been ruptured from commencement of labour, os dilated; anterior lip pressed between head and symphysis pubis. Meconium escaped at each pain. Alteration of position of head, without result. Chloroform given, which suspended the pains. Version by combined method. Child born dead. Rest natural. Mother did well.

CASE 51.—*Shoulder presentation.*—Æt. 28; second con-

finement. Male child. There was much difficulty in bringing the head through, but by free swaying and traction it passed the brim. The pelvis was very contracted, the antero-posterior diameter of brim did not much exceed two and a half inches. The child was dead, but mother recovered.

CASE 52.—*Coarctation of brim; version.* Æt. 31; third labour. Male child; dead. Had been in labour two days when first seen. Liquor amnii escaped twelve hours; no progress for ten hours after the third day. Head entered the brim one-third; the os had not yet passed over the head. Patient exhausted. Version was adopted, with external and internal method, under chloroform. Child, however, was born dead, from difficulty in bringing head through brim. Mother did well.

CASE 53.—*Funis and head.* Funis at the brim, pressed upon by the head; os fully dilated, membranes perfect; brim was small; it was considered better to turn, as during each pain the circulation in funis was stopped; version was accomplished by external and internal manipulation. Child was born twenty minutes after. Some detention taking place in the delivery of the head, it failed to breathe. Heart pulsated, however, for four minutes after delivery. Mother did well.

CASE 54.—A twin. *Hand and knee* presenting. The latter was pulled down, the head receding and the rest terminated naturally. Recovered.

CASE 55.—*Head, hands, feet, and funis* presented, with partial placenta prævia. Did well.

CASE 56.—*Hand and foot*—latter brought down. Did well.

CASE 57.—*Hand, foot, and funis.* Primipara. Foot seized, but the uterus being very irritable, much difficulty occurred in bringing it down. By perseverance, however, it was accomplished, and the rest terminated by nature. The child died before the breech was fairly down. Mother did well.

CASE 58.—*Hand and foot.* Child died. Mother recovered.

CASE 59.—*Hand and foot.* Child living. Foot drawn down. Recovered.

CASE 60—70.—Cases of version for placenta prævia, *q. v.* Nos. 2, 5, 7, 8, 11, 12, 13, 14, 16. Three of them died. Besides these cases, two others in which it was adopted, not reported.

CASE 71.——For prolapsus of funis; under chloroform. Child lived. Recovered.

CASE 72.——A case of accidental hæmorrhage, after transfusion. Mother died. (See Accidental hæmorrhage, Case 6.)

CASE 73.——Case of hæmorrhage between the birth of twins; version performed easily, placenta came away naturally; but she died from peritonitis on the fourth day. (Case 14.——Peritonitis.)

CASE 74.——*Funis* presentation. Æt. 22; third confinement. Male child dead; funis and head presented; version performed; long forceps to extract the head. Mother recovered.

CASE 75.——Version after forceps. Mother recovered.

CASE 76.——Version after forceps. (See Forceps, Case 34.)

CASE 77.——Vertex presentation. First confinement. Male child born dead. Lingering labour. Head detained at brim. Os being small, it was thought best to turn, which was done under chloroform. Mother recovered.

CASE 78.——Æt. 33. Former labours with abnormal presentations in many, lingering in all. When the membranes had ruptured, the hand, foot, face and funis presented. The leg was seized, which it was found difficult to retain, and tape was fastened to it, and then secured. Ergot was given; the pains having gone off. The child was gradually expelled, the head and shoulders giving some trouble. The placenta expelled naturally. The child was dead, the funis having ceased to beat for some time before birth. Patient did well.

Forceps.

This instrument was applied in 82 cases, or 0·55 per cent. It was used alone in 75 cases. It was succeeded by craniotomy in 5 cases, and by turning in 2. The conditions requiring its use were—

1. Want of due relation between fœtal head and maternal passages in 71 cases.
2. Face presentations . . . . 1 ,,
3. Breech presentation . . . . 1 ,,
4. Eclampsia . . . . 3 ,,

No death occurred to the mothers. Of the children, in 67 cases 12 were stillborn.

Records of the cases show that in one instance the child weighed 14 lbs., which was born alive; two were 10½ lbs.—one living, one dead. In another, the head measured 16½ inches round. Another was hydrocephalic, and had spina bifida.

Out of the 70 cases where mention is made, 36 were in primiparæ, 34 were in multiparæ.

The following report shows an outline of the principal cases : —

Case 1.—Æt. 30 ; sixth confinement; all good labours. In labour eleven hours when seen ; remained in very active labour for five hours more, without any advance of the head ; the soft parts had become swollen and œdematous. The forceps were applied, and she was delivered of a living male child. Recovered excellently.

Case 2.—Æt. 30. Primipara. Male type of pelvis. Early pains for thirty-four hours. Full labour twenty-four hours, when the head descended on to the perinæum, after very severe pains. Some six hours having elapsed with almost continuous pain, no progress having been made, the parts being very swollen, the tongue brown, and bones of the fœtal head overlapping much, the forceps were applied. The blades would not lock at first : a second attempt was also made, but did not succeed till the patient was placed on her back ; when, after a little trouble, the blades were adjusted, and the child delivered, with a slight laceration of the perinæum.

Case 3.—Primipara. Irish ; æt. 39. In labour many hours. Soft parts being rigid, hot, and swollen ; the patient exhausted ; forceps were applied, and a living female child born. The rest of labour natural. Patient did well.

Case 4.—Primipara ; æt. 26. Had been in good labour more than twenty-four hours : no progress having been made for last three hours, forceps were applied, and child delivered alive. Head was large, and very ossified. Case did well.

Case 5.—Irish ; primipara ; masculine development. Had been in strong labour for ten hours, when pains subsided for twelve hours, after which they returned with vigour. Head had descended into cavity of pelvis. She went on another twelve hours, when, exhaustion coming on, with hiccough, pale countenance, forceps were applied, and a living male child delivered. Head was large and well ossified. The mother,

though much exhausted, ultimately did well.   Outlet of pelvis imperfect.

Case 6.—Primipara; æt. 24; female child.   Had been twenty-four hours in hard labour; the head had been in the cavity for more than twelve hours, without any advance. Symptoms of exhaustion appearing, she was delivered by forceps of a living female.   Did well.

Case 7.—Third child; male.   Short forceps applied; child delivered.   Adherent placenta; hour-glass contraction; post-partum hæmorrhage.   Recovered.

Case 8.—Forceps applied to head, after delivery of breech, for hydrocephalus and spina bifida.   Recovered.

Case 9.—Æt. 26; first confinement.   Female; living. Had been in labour thirty-six hours.   The head had not advanced, and the mother being exhausted, the forceps were applied without difficulty, and a large female child was born, weighing $10\frac{1}{4}$ lbs., measuring 14 inches round the abdomen.   The perinæum was slightly lacerated.   Retention of urine for three days afterwards.   Recovered without any further drawback.

Case 10.—Æt. 39; first confinement.   Male; dead.   Pains having lasted fifteen hours when first seen, were still strong, and the attendant, after repeated examinations, thought the os fully dilated.   After twelve hours, this was found not to be the case; the os being felt far up behind, and only the size of a shilling.   The anterior wall of the uterus was stretched thinly over the head.   A dose of opium was given.   This continued without any alteration (notwithstanding two grains of opium) for twenty-one hours; the pains being increasingly severe all the time, but not dilating the os any further.   Antimony was then administered in small doses every hour for six hours without any result.   In twenty hours, however, after this, the os began to dilate; but it was twenty-four hours more before it was fully dilated, pains continuing every five minutes up to this period.   Another twenty-four hours then elapsed, the pulse continuing good the whole time, but the head was still resting on the brim.   The mother's powers now began to flag, and she became delirious.   The forceps were therefore applied, and in an hour and a half the child was delivered.   It had been, apparently, three days dead.   The placenta was slightly adherent, and was removed an hour after-

wards. Opium was then given. The patient rapidly recovered without a bad symptom.

CASE 11.—Æt. 20 ; first confinement. Male child. Uterus fairly in action ; os dilated ; head descended to vulva, when pains ceased. The short forceps were then applied, and the child delivered dead. The placenta was removed by the hand, and hæmorrhage followed in ten minutes, which was stopped by pressure and cold water. Made a good recovery.

CASE 12.—Æt. 22 ; first confinement. Male child ; living. In labour seventy-eight hours. Pains still very powerful. Head in cavity, not impacted ; but the patient becoming exhausted, the forceps were applied, and the child delivered without difficulty. Perinæum lacerated by the shoulders ; pelvis of a male type. Did well.

CASE 13.—Æt. 34 ; seventh confinement. Male child ; alive. Membranes ruptured twelve hours when first seen. Labour hard, but head descended only partly in brim, where it was nearly impacted with only slight movement. Forceps were applied, and after firm traction the child was delivered alive. Recovered.

CASE 14.—Æt. 20 ; first confinement. Female child ; stillborn. Pains severe and frequent for many hours ; no progress for six hours. The membranes ruptured some time. Head nearly impacted in cavity, resting on tuber ischii and rami of pubes. Forceps were applied, and a dead child delivered after some trouble. Pelvis of mother was of male type ; alæ feebly developed. She did well.

CASE 15.—Æt. 29 ; fourth confinement. Male ; dead. Head resting in brim. Pains very strong, but no advance, notwithstanding that attempts were made to rectify its position. Long forceps were applied, and after much difficulty the head was delivered. Child dead some time. Head very hard. All her former children born dead, without instruments.

CASE 16.—Æt. 22. Primipara. Twins. First child born naturally, when, shortly after, the membranes of second came down and were broken ; the funis prolapsed. Some time elapsed before she was seen, at which time there was only slight pulsation in the funis. The head being too low to attempt version, forceps were applied. Post-partum hæmor-

rhage; adherent placenta. Two fits—one before and one after delivery. Urine albuminous; fourteen days after, merest trace. Mother could sit up by tenth day, and did well ultimately. Child (second) was dead before forceps were applied. (See Eclampsia, Case 12.)

CASE 17.—Fourth confinement. Small woman; always had hard labours. Head hard. In violent labour six hours. Pulse 100. Tongue glazed and dry. Pains very frequent and severe. Head partly entering brim. No progress. Chloroform given, which moderated the pain. Forceps applied; head soon extracted. Recovered.

CASE 18.—Æt. 29; fourth confinement. Male; dead. Former labours always hard. Had been in hard labour six hours without progress; pulse quick, tongue furred, membranes ruptured some time. Anterior lip of uterus swollen, as also vagina. Head at brim, no progress. Forceps applied, and a large child extracted (10½ lbs.) dead. Funis came down with the body, and was compressed by it. Large size of child's body detained it so long in vagina, that it died. All attempts at resuscitation were ineffectual. Post-mortem examination of child showed much effusion of blood beneath the scalp, apparently from the longitudinal sinus, which was ruptured just behind anterior fontanelle. There was also blood effused between the bone and dura mater. Brain highly congested. Mother's brim small; bony outlet contracted by exostosis from middle of sacral curve. She did well.

CASE 19.—Æt. 32; first confinement. Male child; living. Fourteen hours in labour. Head four hours on perinæum, resting on inner surface of arch, which prevented it descending, although the pains were severe. Parts dry, and she becoming exhausted and faint, forceps were applied, and the child quickly delivered. It breathed after some trouble, and it and the mother did well. This woman might possibly have been delivered by natural efforts.

CASE 20.—Æt. 29; first confinement. Female child. Natural labour. Head in vagina when a convulsion occurred, which lasted five minutes. Headache and confusion succeeded. Another fit occurred in a quarter of an hour, of a more apoplectic character with stertorous breathing, dilated pupils, and livid lips. This lasted five minutes; immediately afterwards delivery by forceps

was effected. Two more fits occurred within six hours, which were the last. Tartar emetic was given every four hours with calomel. Mother and child did well. Urine albuminous; tested daily for two weeks, found gradually to become healthy, and in twenty-seven days there was no trace remaining. (*Vide* Eclampsia, Case 8.)

Case 21.—Æt. 30 ; fifth confinement. Female child. Short woman. Head at brim, with powerful pains for five hours, without progress. Forceps were applied. Some difficulty was experienced in bringing the shoulders through the brim, and this nearly killed the child. But after some little trouble delivery was completed, and the child, apparently dead, was allowed to bleed from the funis. Artificial inspiration was tried, and the child at last recovered. The rest of the labour was natural, and both did well.

Case 22.—Æt. 36 ; first confinement. Passages small, pains feeble, lingering labour for many hours. Os uteri tardy in opening. Four doses of secale had failed to excite pains. At the end of twenty-four hours pain had become more vigorous; head at the vulva ; there it remained for three or four hours; pulse becoming 130 ; tongue dry and brown. Short forceps applied and child born. Patient did well.

Case 23.—Case of twins. The first child detained by being hung up against the other ; pains strong and frequent for many hours without expulsion. At last, forceps were applied, and the child quickly descended. Second child came by foot, twenty minutes after. Both alive. Mother did well.

Case 24.—Second confinement. Child dead. Patient had been a long time in labour; pains violent; meconium discharged; long forceps were applied, and after much difficulty the child was born dead ; the head was highly ossified, and had a circumference measuring $16\frac{1}{2}$ inches. Mother did well.

Case 25.—Æt. 39 ; tenth labour. Child living ; lingering labour. Patient exhausted; pains ineffectual ; uterus contracted round the child; os fully dilated. Long forceps were applied, and a live child delivered. Mother did well.

Case 26.—Æt. 25. Primipara ; in labour twenty-four hours. Head in same position for six hours; violent pains during whole time. Apex of head nearly in vulva, bones overlapping very much. Pains more painful than expulsive.

Chloroform administered, which relieved the circular contraction of uterus. Forceps applied, and head delivered without any great obstruction. Child alive and hearty.

Case 27.—Æt. 43 ; fifth confinement. Female, living child. Small pelvis, first two children delivered by forceps ; last labour seven years ago. Forceps applied. Did well.

Case 28.—Æt. 23 ; first confinement. Male child. In labour two days. Head nearly on perinæum ten hours, not impacted. Patient exhausted ; ergot had been given. Forceps applied ; slight traction used, and labour completed. Child born alive. Mother did well.

Case 29.—Æt. 35 ; fifth confinement. Male, living child. Three times forceps before. Lingering labour, with great exhaustion ; pulse 140. Head resting on rami pubis, and had not entered the sacral curve well. Forceps used. Recovered.

Case 30.—Æt. 22. Lingering labour. Head resting for six hours near the outlet, without progress, although pains were exceedingly severe. The woman had become very exhausted. Forceps were applied, and the child was extracted alive. The woman recovered quickly and well.

Case 31.—Æt. 24 ; first confinement. Male, vertex, living. In labour thirty hours ; for ten hours active pains. Head partly in cavity. Vertex nearly on perinæum. No movement for five hours ; pains frequent. Long forceps applied, when, with some difficulty, the child was delivered alive. Head was large. Mother did well.

Case 32.—Æt. 30 ; primipara. Child alive. In labour eighteen hours. Head touching perinæum, but was arrested by tuberosities of the ischia. Bones overlapping very much. No movement for five hours. Face to pubes. Pulse 100 ; tongue furred. Short forceps applied. Child born alive very soon. The rest natural. Recovered.

Case 33.—Æt. 23 ; first confinement ; female child, still-born. In labour forty-eight hours, with strong and nearly constant pains for eight hours without any advance. Pelvis of mother small ; child's head large, and much elongated. It was born asphyxiated ; restored by artificial respiration.

Case 34.—Æt. 36 ; tenth pregnancy. Dead child. Five children delivered by instruments, all of which died ; but those

by natural efforts lived. The head laid over pubis above brim. Antero-posterior diameter of pelvis about 3 to $3\frac{1}{4}$ inches. Right side of pelvis straighter than left. She had been found in labour twelve hours. Pains very severe. Forceps applied without chloroform. All efforts by forceps were in vain, upon which turning was resorted to after chloroform had been given. The uterus being very irritable, much difficulty was experienced. Gentle continuous traction succeeded, but the head again lodged in the brim, and it was only after persevering efforts for about eight minutes that it was delivered. The funis pulsating slowly, inflation of the lung through a catheter excited the fœtal pulse to 120, but natural respiration was never brought about. Mother did well. (Case 76, Version.)

CASE 35.—Æt. 28 ; first confinement. Male child, living ; labour had been going on three days without the mother getting any sleep. Head on perinæum ten hours, moveable ; pelvis ample. Pains having much abated in force, two doses of ergot were given, but with no material result. Uterus contracted every four minutes, remaining somewhat firm between the pains. The meconium was escaping, and there was no sign of fœtal life. After a short time ergot was again given, with stimulants, but the clamping action of the uterus still continued, without efficient pains. The short forceps were applied, and gentle traction used. The child was delivered in ten minutes, the pains freshening towards the end. It was living. Mother did well.

CASE 36.—Æt. 37 ; fifth confinement. Male child, living. Child's head detained at bony outlet for six hours. It was large. Pains severe ; uterus tightly clamped round child between pains. Patient exhausted. Short forceps applied. The caput succedaneum became very tense during extraction ; but the child was not dead, and was delivered soon after. Both did well.

CASE 37.—Æt. 25 ; third confinement. Child female ; dead. The last child was delivered stillborn by forceps. In labour thirty-six hours ; strong pains nearly all the time. Liquor amnii had escaped many hours. Os uteri fully dilatable, but not fully distended, as the head rested on the pelvic brim, and could not enter it. Head detained by the sacral promontory, which was low down, nearly to level of pubis. Sacrum

one third shorter than normal. Transverse diameter good. Symptoms of exhaustion coming on, long forceps were applied. Head shortly passed the brim, pains became more forcing, and labour was gradually completed. Child dead. Rapid recovery.

CASE 38.—Æt. 26; primipara. Large tumour in cavity. Forceps passed, but failing to deliver, craniotomy was employed. (See Craniotomy, Case 12.)

CASE 39.—Æt. 25; second labour. Male child, living. Small pelvis. In labour seven and a half hours. Os dilated six hours. Long forceps used; child delivered alive. Forceps used with her first labour. Both did well.

CASE 40.—Æt. 25; third confinement; child living. First labour with forceps; second easy. Had been in full labour twenty hours; no movement for five hours; head not impacted, about two thirds in cavity. Soft parts very swollen. Pains very straining, face swollen and livid from exertion. Attempts were made to alter the position of the head, without result; forceps were therefore applied, and a living child delivered very shortly. Both did well.

CASE 41.—Primipara. Female; in violent labour eighteen hours; head made but little progress for twelve hours, but not impacted; pulse about 110; face swollen and congested; vagina hot and dry. Forceps used. Child alive, but nearly asphyxiated. Rest natural. Did well.

CASE 42.—Æt. 21; primipara. Male child, born alive; had been in lingering labour for many hours. The head was on the perinæum for seven hours, when forceps were applied, the child delivered in a quarter of an hour, alive. Both did well.

CASE 43.—Æt. 32; fifth confinement. Forceps in last two labours, all tedious. Membranes had been ruptured seven hours. Pulse good; tongue brown. She was somewhat exhausted. Head in cavity of pelvis, pressing against pubis. Had been for many hours in strong pains, without progress. Attempts to press the head backwards of no use. Pains now quite ceased; ergot given, which did not restore the rhythmical action of uterus, although there was continuous contraction without any expulsion; she complained much of pain in stomach in consequence. The forceps were applied, without chloroform at first, but the uterus grasping the fœtal head so tightly, it

made it difficult and dangerous to introduce them; chloroform having been given, they were applied without trouble, and a living child readily extracted. The patient did well.

Craniotomy.

The fœtal skull was opened in 18 cases, or 1 in 833 cases, or 0·12 per cent. In 17 of these for want of due relation between the fœtal head and the parturient passages. In one of these there was a tumour in cavity, and in another dense bands of cicatrices.

The greatest want of adaptability was in a case where the antero-posterior diameter was $2\frac{1}{4}$ inches, while the child weighed $10\frac{1}{2}$ lbs.

The operation was resorted to after version alone, in 3 cases:

After forceps and version, in 1 case:

After forceps alone, in 4 cases.

Four deaths occurred; one from post-partum hæmorrhage, two from laceration of vagina and uterus,* and one from too long detention of head in vagina before operation.

In twelve cases the sex of the child is mentioned, seven were males, five females.

The following are the records of the principal cases. It was known in at least six of the cases that the child was dead before the operation; in the remainder no mention is made.

CASE 1.—Vertex, female; third confinement; mother æt. 33. Exostosis projecting an inch from body of pubis. Head impacted in antero-posterior diameter. In labour twenty-four hours; symptoms of exhaustion; perforation and delivery. Recovered without a bad symptom. She had been delivered in like manner in a previous labour.

CASE 2.—Vertex, male; ninth confinement; æt. 37. Perforation; death immediately afterwards. Post-mortem examination showed laceration of posterior wall of vagina and cervix uteri.

CASE 3.—Æt. 20; first confinement; strumous constitution. Antero-posterior diameter of pelvic brim $2\frac{1}{2}$ inches. After the

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* These cases did not occur under either of the present physicians, and therefore they are unable to say whether the act of version or the spicula of bone produced the injury, or whether there were unusual feebleness of the uterine walls.

pains had lasted twenty-nine hours was first seen. Membranes protruding through the vulva; head still on brim; pains slight; os fully dilated. Small doses of opium were given. Pain went off for twenty-four hours, when she became restless and thirsty, with pulse 100. After another twenty-six hours craniotomy was performed, and as the head was still too large to pass, the child was turned and extracted. Twelve hours afterwards the pulse was 120; tongue furred, but felt comfortable. Six hours later she became feverish, and twelve hours later pulse was 160, with increased fever and brown tongue. From this point she gradually became worse, with incessant but painless vomiting, and very rapid pulse. She died at the end of the third day after the operation, consciousness being perfect to the last. Uterus was found firmly adherent to abdominal walls and to jejunum; it was large and uncontracted, with thin, flabby walls. Sloughing laceration of uterus in vertical direction, about its middle. Tubercular peritonitis. Diameter of pelvis as above.

CASE 4.—Irish; æt. 26; first labour. Female child; membranes ruptured four days before she was first seen, at which time she was in tolerably good condition. Head of the child in vagina, with a large scalp tumour descending to near the outlet. Soft parts very rigid. About twenty ounces of urine were drawn off, warm fomentations applied. After twenty-one hours' waiting it was found that there was no material progress, and the fœtal heart having ceased to beat, the head was perforated, and the patient delivered one hour afterwards of a large female child. Patient did well.

CASE 5.—Craniotomy after forceps and *version*. Mother recovered. No further report.

CASE 6.—Æt. 28; primipara. Female child. The patient had been in labour twelve hours when the attendant first arrived; the os was the size of a sixpenny piece; pains pretty strong. Funis found presenting, with the left shoulder. Membranes intact. Five hours afterwards, after chloroform had been given, the os was enough dilated to admit of turning. The body of the child was quickly brought through, but the head became impacted, and as the funis had ceased to pulsate, it was considered advisable to perforate; this was done through the occiput, and delivery speedily completed. Placenta followed shortly, and patient did very well.

Case 7.—Æt. 39; sixth confinement. Female child. Had been about twenty-four hours in labour, pains very severe; os about the size of half-a-crown, very rigid. Nine hours later had made no progress, although a full dose of opium had been given. Quarter grain of Ant. Tart. was then given every twenty minutes, for three hours, without result. Eight hours more having passed, the os had become slightly enlarged, and its edges œdematous. Woman much exhausted. Pulse very quick and weak. The head was then perforated, and delivery accomplished speedily. Rest of the case natural. She did well.

Case 8.—Æt. 23; second confinement. Male child. Short, ill-made woman. When first seen had been some time in labour. Membranes ruptured three hours. Slightly exhausted; tongue furred; pulse slow. Head lodged between sacrum and pubes. Os uteri dilated. Pains rapid and very strong, but producing no effect. Rectum loaded with fæces; enema ordered. No progress was made in five hours. Pains had been continuous, but flagged. After seven hours more the forceps were applied, without effect. Chloroform was then given, and the head perforated. By means of the crotchet and craniotomy forceps the head was delivered in an hour and a half. The placenta was partially adherent, but was detached without difficulty. Recovered. The antero-posterior diameter was $2\frac{1}{2}$ inches. Craniotomy was resorted to in the previous labour.

Case 9.—Perforation after version for contracted conjugate diameter. After version it was very difficult to bring the head through; perforation behind ear and through mouth was tried, and by means of a hook in the perforation behind the ear, it was brought down (*vide* Version, Case 49). Mother recovered.

Case 10.—Perforation after version for small brim, with ossified head of fœtus. Female child. It was thought it might have been delivered by the feet, but when the head again was opposed to the brim it would not pass till it was perforated behind the ear, after which it came through. Mother recovered, after slight metritis. (See Version, Case 48.)

Case 11.—Æt. 40; sixth confinement. Hard labour with all, last two particularly so, but all children born living; the last, four years since. The sacrum externally showed too much pro-

jection backward at its lower part, while the upper fell forward. Liquor amnii had escaped, and the pains in gentle action for thirty-six hours; twelve hours before, secale was given, without bringing the head down lower. Os fully dilated, but the uterus was firmly contracted about the child continuously, and very hard. Pulse 120. No signs of fœtal life. Taking her history into account, it was thought turning might save perforation, but when the hand was introduced for the purpose, it was found that there was only just space enough in the antero-posterior diameter (it was found by careful measurement by fingers after to be about $2\frac{1}{4}$ inches) to pass the thickness of the hand; perforation was therefore employed at once, and after the calvareum was removed to some extent, face presentation was produced by a small hook in orbit, and the head soon delivered; the rest followed slowly, the pelvis especially gave much resistance; the rest was natural, and she did very well. Chloroform was given before the attempts to turn, and was continued till she was delivered. It probably relaxed the continuous action of the uterus.

CASE 12.——Æt. 26; first confinement. Male child. She had been in full labour eighteen hours. The head was not impacted, about half-way into cavity; obstructed by a tumour in front of sacrum, not of a globular but flattened form, about one inch in thickness, and spread out laterally so as to extend to the tuberosities of the ischium upon each side, upwards as far as half-way up sacrum, and downwards to tip of coccyx. It was semi-elastic, but dense in parts. It was thought the forceps would have been enough to bring the head by the obstruction; they were applied, but they failed, for the head pushed the tumour before it, thus increasing the difficulty. After fair trial with them, and puncturing the tumour through rectum without result, perforation was adopted, and only after very much trouble was the head brought through. The whole calvarium was removed first, the rest followed naturally, and she soon was well. The tumour was behind the rectum, attached to the sacrum firmly, apparently of fibrous structure. No history could be made out to throw light upon its origin.

CASE 13.——Æt. 37; third confinement. A very small woman. Had recto- and vesico-vaginal fistulæ, produced by the first labour; but in the other, three years before, no particular

tympanitic, very tightly distended by gas. Small quantity of ascitic effusion. Pulse 120, very feeble. Patient haggard, exhausted. Tongue brown, slight sordes on teeth; vomiting occasionally. Motions lax, and escaping involuntarily. The head of the child was perforated, and the child brought away with some little trouble. The uterus only partially contracted afterwards; it became afterwards contracted in centre, and the placenta was not thrown off; hæmorrhage supervening, the placenta was extracted. Uterus contracted, but soon relaxed again, wifh severe hæmorrhage, most difficult to restrain. The hand was passed within many times, without any result; the fist was then pressed inside, against the part where the placenta was attached, and firm compression outside, and the flooding ceased. No other appliances were at hand. She, however, died next day, having never fairly rallied. Aortic compression attempted, but the large state of the uterus, and the tympanitis of bowels, prevented the pressure being effectually made.

Ruptured Uterus.

Three cases of this accident have occurred, besides the two which accompanied the operation of craniotomy (see Cases 2, 3). In two of the cases the pains were very feeble, and in other only brisk.

They all occurred in vertex presentation. The proportion to the number of cases is 1 in 4957.

CASE 1.—S. S—, æt. 39; ninth confinement; began to be in labour at 4 a.m. Aug. 25th. When first seen at 8 a.m., os size of a shilling; slight pains, becoming more frequent (from three to six minutes apart); had fainted several times during morning, for which stimulants were given. In a short time the head had entered vagina, which was moist and dilatable. Rectum loaded. Pains began to increase in severity; waters broken; head descending and receding as in ordinary labours; shortly the pains became very frequent, and began to run into one another. Head was pressing on perinæum, and making rapid progress. Three or four violent pains came on, when suddenly they ceased, and patient complained of pain in abdomen; soreness towards umbilicus: she felt somewhat fainter, as she had done before. In a quarter of an hour she raised

herself in bed for a minute, when the pulse began to flag, and the extremities became cold and clammy; face deadly pale; continued getting worse. Stimulants were given, which produced no effect, and in about two hours and a half after first arrival of attendant she died. Child was delivered by forceps, post-mortem; it was, however, dead, although efforts were made to restore animation. Placenta found to be detached, and its surface covered for greater part with dark-coloured clots.

Post-mortem examination.—Uterus found ruptured in longitudinal direction in left anterior wall, from os (which was left entire) seven inches upwards. Large quantity of blood had escaped into peritoneum.

The report mentions she was anæmic, with feeble pulse, flabby muscles, and thin. Had been living very badly. Former confinements very rapid.

This case is reported in these Reports for the year 1860.

Case 2.—Multipara; æt. about 35; easy labours before; had had slight pains for about twelve hours, when suddenly she was taken with collapse and hæmorrhage, and died shortly afterwards, before any one arrived. The child was delivered post-mortem *per vias naturales*, but was dead. A large rent was found in upper half of vagina and lower half of uterus. Blood extravasated into peritoneal cavity.

Case 3.—Æt. 42; tenth confinement. Male; full term. Had been somewhat anæmic from loss of blood a month before, but was going on as in ordinary labour, when she was suddenly seized with collapse; she became pale and cold, vomited, and died within five minutes.

Cæsarean section was objected to.

The necropsy, on same day, showed the uterus to have been ruptured from fundus to os along the anterior wall. The child was in abdomen, a large quantity of blood in peritoneum.

Dr. Hicks examined the tissues carefully by the microscope. They showed slight evidence of an increased fatty degeneration,—that is, a preternatural advancement of involution,—but scarcely sufficient to account for the accident.

Eclampsia.

Eighteen cases of this complication are recorded, or 0·12 per cent.   Of these, 13 recovered; 5 died, 2 of them undelivered.

Convulsions occurred before full term in 2 ; just before labour in 5 ; during labour in 4 ; after labour in 4.   Of the remainder no notice on this point exists ; but, in all probability, they occurred close to or during labour.

In all, where the urine was examined, albumen was found.

Out of 17 where mention is made, convulsions occurred 7 times in primipara, 10 times in multipara.

Of 15 cases, the child was born alive in 12, dead in 3. In 1, an endeavour was made to save the child by Cæsarean section post-mortem, but it was unsuccessful.

MOTHERS RECOVERED.

CASE 1.—Details wanting.

CASE 2.—Æt. 31 ; third confinement.   Child living.

CASE 3.—Æt. 24 ; first confinement.   Insensible for three days after delivery.   Child dead.

CASE 4.—Æt. 25 ; third confinement. Female child, born living.   Convulsions of the " hysterical " kind.

CASE 5.—Æt. 22 ; first confinement.   Twins; both born alive.

CASE 6.—Æt. 38 ; seventh confinement.   Slight convulsions before delivery ; œdema of legs ; albuminuria.

CASE 7.—Æt. 34 ; seventh confinement.   Forceps used. Male living child.

CASE 8.—Æt. 29 ; first confinement. Female child; natural labour.   Fœtal head in vagina when first convulsion occurred, which lasted five minutes.   Headache and mental confusion succeeded.   Another fit came on, about a quarter of an hour after, of a more apoplectic character, with stertorous breathing, dilated pupils, and livid lips.   This state lasted five minutes, and directly afterwards delivery by forceps was effected.   Two more fits seized her within six hours, which were the last. Treatment—calomel, antimony.   Mother and child did well. Urine was found from the first to be albuminous: it was

tested daily for two weeks, during which time the quantity gradually decreased, till at the end of four weeks none remained.

CASE 9.—Æt. 19; first confinement; natural labour. Towards latter end of pregnancy she felt drowsy, with headache; had œdema of ankles. An hour after labour was attacked by an epileptiform fit, and again twice in three hours. From this time they increased in frequency. Ice was applied to the head, heat to the feet, and aperients given. She was slightly conscious on the following morning, the fits being more of the hysterical form. Cupping to the nape of neck; a blister behind each ear. On the third day she was unconscious, deaf, incoherent; pulse weak; the lochiæ stopped, milk still in breasts. From this time she began to improve gradually, and by three weeks afterwards was nearly well. Urine albuminous the whole time of attendance. Child died from convulsions, three weeks old.

CASE 10.—Æt. 38; tenth confinement; natural labour; child alive. Convulsions occurred six hours after labour, but did not recur.

CASE 11.—Æt. 17; first confinement. Female child; living. An hour and a half after labour, convulsions set in for twenty-four hours; she was unconscious for fifty-four hours. Bleeding to 12 oz. produced very little result. Croton oil was given. She gradually became conscious; was very weak; pulse quick, and some feverishness for some days. On the third day, the elbows and back had sloughed (not deeply). Bark and ammonia were given, and she gradually recovered. The urine was highly albuminous at first, but it ultimately disappeared.

CASE 12.—Æt. 22. Children dead. Premature twins. First child born naturally: shortly after, the membranes of second child came down and were broken; the funis prolapsed. Some time elapsed before she was seen, at which time there was only slight pulsation in the funis. It was thought possible to have turned, but the head was too far down: forceps were therefore applied, and the child soon delivered. One convulsion occurred before the application of forceps, and another after birth of child. Post-partum hæmorrhage from adherent placenta occurred: this was removed. She soon recovered, and was up on the tenth day. (Case 16 of Forceps.)

Case 13.—Æt. 33 ; second confinement. Convulsions six days before labour. Child alive.

Case 14.—Æt. 44; about six months advanced in fourth pregnancy. Former labours good; of good general health, excepting headaches and vomiting occasionally, for three or four years : always had swelling of legs during pregnancy. She awoke with slight pains in abdomen and back, occurring at intervals. Soon after, vomiting came on : complained of weight and pain about the chest, and of being very sleepy. She slept a little, and complained of increased pain over the heart. She was then instantly seized with convulsions, which lasted about five minutes, from which she did not completely regain consciousness. Shortly after this, fits occurred frequently, she remaining in a state of insensibility between. By seven hours after the first she had become deeply comatose; pulse 120 per minute; convulsions very severe; face congested; respiration hurried. Cervix high up, dilated so as to admit one finger. Child presenting transversely; bled to 20 oz., which increased the interval between the fits considerably. Purgatives and tartar emetic in small doses given. There were no labour pains at this time; no urine was found in the bladder by the catheter. The convulsions shortly after recurred with increased frequency, indeed, almost incessantly; and she died in one, about twelve hours after the first symptoms. No postmortem allowed.

Case 15.—Æt. 24; third confinement; natural labour; child living. Twelve hours after labour had epileptic fits, which continued fourteen hours, when she died. At the necropsy, all the organs were found healthy, except the kidneys, which were in the acute stage of tubular nephritis.

Case 16.—N—, æt. 22; full term of second pregnancy; did well in the former. Had, during second pregnancy, œdema. A slight flooding came on, from fright, one month before : never quite well since; suffering with pain in head, giddiness, and confusion; becoming, before her confinement, worse in these respects. As labour began she became unconscious, incoherent, and delirious; pupils rather dilated. Two hours after this had convulsions, remaining insensible between, the os uteri dilating. The breathing shortly became stertorous; pulse 100, full and strong. These symptoms increased, pulse

rising to 116, full and bounding. Labour also followed briskly; and at eight hours after the commencement of labour, during a violent fit, she was delivered of living female child, remaining afterwards unconscious. She was bled to twenty-four hours. Tartar emetic given. She died after, but the record of the details is lost.

CASE 17.—Æt. 30; multipara. Was found in a dying condition from deep coma, with general œdema; in the last stage of pregnancy: labour had not begun—no trace of fœtal heart could be found anywhere. The œdema had existed some weeks past. She died very shortly. Cæsarean section was performed almost immediately after death; but the child was dead, and in a state of spasmodic rigidity. The right kidney of the mother was in the small and hard stage of Bright's disease. The attendants said she had had ten fits the day before she died.

CASE 18.—Æt. 18; primipara, at full term. After having had nausea and blindness for some days before, she was seized with an epileptic fit, which returned about every half hour, being insensible between the attacks. The pulse about 130, very feeble; urine highly albuminous. The membranes were ruptured twelve hours after commencement of convulsions, the os being size of a half-crown. Sinapisms were applied to nape of neck and the legs; one drop of croton oil given. Labour progressed; but the pulse rose to 160, very feeble; face pale. Labour went on quickly, and she was in two hours and a half delivered of a dead child. Placenta came away naturally. There were convulsions at each labour pain; the larynx was but little affected; opisthotonos occasionally present. Three fits occurred after delivery, the last twenty-four hours after. She was confused next day, but more conscious on the third day, and, four days after, was nearly natural in mind. She, however, from this date fell into a low typhoid state; urine and fæces passed involuntarily; tongue dry and brown; much pain in back; imperfect state of mind; and she gradually sank ten days after delivery. No post-mortem examination; urine albuminous throughout. It was very scanty *before delivery,*—uric acid lozenge-shaped crystals, copious, with waxy and epithelial casts. *After delivery,* next day, sp. gr. 10·27, more copious, casts plentiful, with lithic acid

crystals, flat lozenges, and pale lithates. Fourth day after, sp. gr. 10·25, more copious, less albumen, fewer casts, mostly waxy, still with lithic acid crystals.

Pyæmia.

Two cases of distinct arthritic pyæmia are reported, both of which proved fatal, after natural labour. It was a curious point in these cases that, although the attendants had in each case delivered from fifteen to twenty cases before the character of this complaint was recognised, yet to none of the patients was any disease communicated.

Case 1.—Case of twins, naturally born, with some post-partum hæmorrhage, which was, however, soon restrained. Went on well till third day, when shivering came on, with pains in all her limbs and joints, especially elbows. Quinine and opium were given, with wine. She, however, gradually became worse, till the eleventh day, when she died. There had been no tenderness of abdomen; the uterus was normal size, not painful on pressure. The lochiæ were suppressed on the tenth day, and did not return.

Case 2.——Æt. 18, single; primipara; child born dead; labour natural. Ten days after labour had a slight attack of pain in the abdomen, which came on from getting up after her confinement. The peritonitis subsided; but four days later she was attacked with intense pains in her joints, which were red and swollen. Pulse 120; tongue brown and dry; skin hot; slight cough. Continued in this state, but with strength gradually failing, for nine days, when she died, having become delirious, with retention of urine, which, when examined shortly before death, was albuminous.

Sectio cadaveris.— Head and lungs healthy. Peritonitis (slight), tympanitis. Liver, pancreas, and spleen healthy. Kidneys large and congested. Uterus natural size. Abscesses and sloughs in the fundus, in the substance, and under the peritoneum, with pus in the sinuses.

Case 3.—Pyæmia is noticed also in Case 5 of Induced premature labour.

Puerperal Peritonitis.

Twenty-nine cases of this disease are reported, about 0·20 per cent. They embrace the more severe forms, but do not include every case of a more local or transient nature, which might last only a few days. The reports of these, being liable to inaccuracy, have not been included. Neither have those cases of cellulitis which generally assume a chronic character, and appear for treatment at a period later than the allotted time for ordinary cases. The separating the various forms of " Puerperal fever" diseases into distinct classes is, strictly speaking, impossible, but practically it is convenient to divide them into toxæmic and peritonitic or inflammatory varieties, the latter including the local inflammation, while the former those in which more or less blood deterioration exists, with its secondary effects. The deaths from the former variety were eighteen. No per-centage of those who died compared with the recoveries can be given, for reasons above stated.

CASE 1.—Natural labour. *Died* twenty-four hours after; cause not very clear; large clot in uterus, with some peritonitis.

CASE 2.—*Died* three days after fourth confinement. Æt. 35 ; child alive, natural labour.

CASES 3—7 inclusive.—All recovered. Treated by quina and opium.

CASE 8.—*Died* five days after delivery. Æt. 28 ; fourth confinement ; child alive.

CASE 9.—M. T——, æt. 22 ; primipara. Labour natural ; went on well for four days ; then taken with slight abdominal pains. Took a dose of castor oil, which acted freely ; next day attacked with more severe pains in bowels, rigors and diarrhœa. Pulse full 100, skin moist ; at night an opiate was given, which rather relieved her. Warm fomentations and beef tea. Pains became worse at end of fifth day, extending into left hypochondrium. Bowels slightly tympanitic ; pulse 100. Tr. opii ♏xx, 4tis horâ. Sixth day without sleep ; pain no better, opium every three hours. Turpentine fomentations—on the seventh day the pains increased in paroxysms, and she died on that day. No autopsy.

CASE 10.—M. B——, æt. 30 ; single ; primipara. Labour natural. Had bronchitis for five months. Went on well till the third day, when castor oil was given, which operated freely. Diarrhœa with much griping came on in the evening ; on the fourth day the diarrhœa was less, but the pain worse, and continued increasing for the next two days. On the sixth day acute peritonitis was established, with a wiry pulse, 120 per minute. Twelve leeches were applied, and opium in grain doses every three hours. The pain relieved, but afterwards delirium came on, with much pain in chest and cough. On seventh day there was urgent dyspnœa, but pulse 100, and full. No pain, but tympanitis ; on the eighth day she became collapsed and died. *Sectio cadaveris.*—Fluid in pericardium and pleura, general peritonitis. Kidneys highly congested. Uterus large, walls thick ; puriform liquid within. Posterior wall much decomposed (portion of placenta ?).

CASE 11.—A case which died, but no detail given.

CASE 12.—Æt. 21 ; second confinement. Child alive ; mother went on well for ten days, but died of puerperal peritonitis (time not specified).

CASE 13.—Æt. 23 ; fourth confinement ; child living ; natural labour. Peritonitis at first, but she died of pneumonia four weeks after delivery.

CASE 14.—Peritonitis set in thirty-six hours after delivery by version for hæmorrhage ; she died on fourth day. (See Version, Case 73.)

CASE 15.—Æt. 30 ; sixth confinement ; child alive. Severe attack about a week after labour, which subsided in a few days. Treatment by opium.

CASE 17.—Accompanied by metritis. Recovered.

CASE 18.—Æt. 20 ; third confinement ; child living. Recovered.

CASES 19 and 20.—Two cases which died—one in the second confinement, the other in the third. No further record.

CASE 21.—Æt. 24 ; third confinement. Breech presentation. Peritonitis on third day, from which she recovered.

CASE 22.—Case with an attack lasting five weeks from adherent placenta. Recovered.

CASE 23.—Æt. 35 ; second confinement ; child living ; labour natural, but lingering. Twenty-four hours after delivery

was attacked with severe abdominal pain, which was relieved by opium. But on the third day the pulse was 120. Tongue brown and dry, with pyrexia. Severe hypogastric pain, and tympanitis. No lochiæ. Sleeplessness ; no urine passed for twelve hours ; it was drawn off. The fourth day vomiting supervened, and she died in the evening. The treatment chiefly calomel and opium.

Case 24.——Æt. 31 ; twelfth confinement. Natural labour ; attacked with peritonitis, and died on sixth day after delivery.

Case 25.——Æt. 27 ; fifth confinement. Natural labour ; died from peritonitis and pleurisy the fourth day after delivery.

Case 26.——Case which died after three months' illness. At first she had symptoms of inflammation and swelling on right side of uterus, which suddenly disappeared ; acute peritonitis with effusion succeeded, which latter became limited to the centre of abdomen, while the intestines were felt to be glued together and to the walls, very noticeable after drawing off the fluid, which was serum tinged with blood. Constipation followed for thirteen days, when it subsided ; after a time diarrhœa set in, and continued till her death. She was exceedingly exhausted for many weeks. She had a convulsion about six weeks after ; a few days after became collapsed, with a purple eruption, like erythema. She improved next day, and the rash was bright ; third day it was gone. She reverted to the condition before this attack, but gradually sank under the colliquative diarrhœa and bed-sores. No necropsy allowed.

Case 27.——Æt. 30 ; sixth confinement. Natural labour. Died on seventh day.

Case 28.——Æt. 19 ; primipara. In labour forty-eight hours, otherwise natural. Well up to fifth day, when lochiæ and milk stopped ; rigors and pain over uterus set in. Pulse was 100, skin hot and dry, with thirst. Uterus was felt enlarged, pressure causing much pain. It appears this attack came on from getting out of bed, and walking across the room, which was wet. Calomel and opium were given. Next day the symptoms had increased, the pains severe, legs drawn up, expression pinched. Diarrhœa came on. Opium given alone every four hours. The day after (third of attack), vomiting supervened, delirium ; abdomen tympanitic ; pains increased. Died next morning ; no necropsy.

CASE 29.—Æt. 36; ninth confinement; tedious labour; forty hours after delivery seized with violent pains, and feverishness. Fourth day after confinement, pulse 112; tongue white, red at edges. Milk moderate; lochiæ only slighly diminished. Abdomen not generally tender, except over where it was full and tympanitic; cough and quick breathing; diarrhœa for the next day. Fifth day, lochiæ had disappeared; abdomen more tender and tympanitic. Pulse same. Sixth day, milk almost gone. Tongue brown, tympanitis increased. Seventh day very much lower—could scarcely take food; and she died on the eighth day, in a typhoid state.

Post-mortem Cæsarean section.

Two women died undelivered from whom the child was extracted almost immediately after death, but in both cases the child was already dead.

In the first case (see Accidental hæmorrhage, Case 5) there had been profuse hæmorrhage, from nearly complete detachment of the placenta. The child's venous system was found highly congested when it was extracted. No signs of life after long efforts at restoration.

In the second (see Eclampsia, Case 17), the patient was seen only just before death. The child was extracted as soon as consent could be obtained (twenty minutes after death), but the child was already dead, its muscles being in a state of spasmodic rigidity.

Puerperal Mania.

Only three cases have been recorded, all of which recovered. Unfortunately the reports are very scanty, and probably do not include the whole of the cases which occurred. The more chronic form frequently occurring later than the duration of the attendance usual in the charity extends, many cases would take place without the cognisance of the attendant.

VARIOUS CASUALTIES.

Thrombus of labium occurred immediately after labour. It was incised on the fourth day, and the patient recovered without anything unusual. She had suffered from fever during pregnancy, and had been accustomed to a standing occupation.

Erysipelas (probably of head and face) occurred in one woman after delivery, from which she recovered. Treated by purgative and sesquichloride of iron.

Albuminuria, anasarca and bronchitis, occurred after labour in one case who recovered.

Pleurisy at time of labour; was recovered from.

Secondary hæmorrhage occurred in one case seventh and eighth days after labour. Recovered.

Large *polypus* (size not mentioned); was discovered attached to the os uteri while in labour. Did well without removal.

Ascites showed itself after labour, as after the previous labours. Recovered.

There are reports of two cases of labour which terminated *without* instruments, in one of which version and craniotomy was employed before; and in the other forceps had been used in the four preceding labours.

Phlegmasia dolens occurred in a few cases. From the reports it is impossible to give any data from which to make any calculation. No death has occurred from it nor with it within the ordinary period of attendance.

Maternal Mortality.

Deaths, from all causes, occurred in 44 cases. This is equal to about 2·94 cases per 1000. This low rate, as before stated, is a satisfactory evidence of the advantage of home attendance over that of lying-in hospitals. The freedom from epidemic puerperal fever is to be noted as one cause of the diminution of the death-rate over that of the former reports. Peritonitis is still the most actively fatal of all the dangers around the lying-in woman, as might readily be expected; but it is a source of much satisfaction that in no instance has so-called puerperal fever been carried to any other patient. The rule of the charity requires the attendant to restrict himself to any case where it is suspected that any form of such complaint is present; this, coupled with the large number of attendants always on duty, lessens materially the risk of the communication. It is also one of the rules that any gentleman who is dissecting, or in the post-mortem inspection room, is not allowed to attend cases.

Peritonitis and pyæmia, it will be seen, produce rather more than half the deaths; while hæmorrhage, from various causes, causes a fourth. The exhausted and debilitated women that form the greater part of the patients are ill able to bear any great loss, and rapidly succumb to hæmorrhage.

The reports are to be found under the various sections; the references to them are given here.

CASE 1.—Sloughing vagina; pneumonia and erysipelas.

CASE 2.—Clot in uterus; peritonitis. Died twenty-four hours after delivery. (See Puerperal peritonitis, Case 1.)

CASE 3.—Peritonitis. (See Puerperal peritonitis, Case 2.)

CASE 4.—Ditto   (ditto, Case 8.)

CASE 5.—Ditto   (ditto, Case 11.)

CASE 6.—Ditto   (ditto, Case 9.)

CASE 7.—Ditto   (ditto, Case 10.)

CASE 8.—Ditto   (ditto, Case 12.)

CASE 9.—Ditto, with pneumonia. (ditto, Case 13.)

CASE 10.—Ditto, after version for profuse hæmorrhage in a case of twins between the births. (See Version, Case 73, and Puerperal peritonitis, Case 14.)

Cases 11, 12.—Peritonitis.   (See Puerperal peritonitis, Cases 19 and 20.)

Case 13.—Ditto   (ditto, Case 23.)
Case 14.—Ditto   (ditto, Case 24.)
Case 15.—Ditto, and pleurisy. (ditto, Case 25.)
Case 16.—Ditto, lived three months, after various changes. (See Puerperal peritonitis, Case 26.)
Case 17.—Peritonitis. (See Puerperal peritonitis, Case 27.)
Case 18.—Ditto   (ditto, Case 28.)
Case 19.—Ditto   (ditto, Case 29.)
Case 20.—Æt. 38 ; sixth confinement.   Child dead.   Died four days after delivery, from " Bright's disease."
Case 21.—Eclampsia ; died undelivered.   (See Eclampsia, Case 14.)
Case 22.—Ditto, post-partum. (See Eclampsia, Case 15.)
Case 23.—Ditto   (ditto, Case 16.)
Case 24.—Ditto, died undelivered ; post-mortem, Cæsarean section.   Child, however, was dead. (See Eclampsia, Case 17.)
Case 25.—Eclampsia.   (ditto, Case 18.)
Case 26.—Pyæmia (arthritic). (See Pyæmia, Case 1.)
Case 27.—Ditto   (ditto)   (ditto, Case 2.)
Case 28.—Ditto, and secondary hæmorrhage after induction of premature labour. (See Induced premature labour, Case 5.)
Case 29.—Concealed accidental hæmorrhage.   (See Accidental hæmorrhage, Case 3.)
Case 30.—Accidental hæmorrhage ; post-mortem, Cæsarean section.   (See Accidental hæmorrhage, Case 5.)
Case 31.—Accidental hæmorrhage ; transfusion. (See Accidental hæmorrhage, Case 6.)
Case 32.—Retained placenta.   (See Retained placenta, Case 1.)
Case 33.—Post-partum hæmorrhage.   (See Post-partum hæmorrhage, Case 2.)
Case 34.—Post-partum hæmorrhage; transfusion. (See Post-partum hæmorrhage, Case 7.)
Case 35.—Placenta prævia.   (See Placenta prævia, Case 8.)
Case 36.—Ditto   ditto, with version. (ditto, Case 14.)
Case 37.—Ditto   ditto. (See Placenta prævia, Case 15.)
Case 38.—Rupture of uterus.   (See Ruptured uterus, Case 20.)

CASE 39.—Rupture of uterus.   (See Ruptured uterus, Case 2.)

CASE 40.—Ditto   ditto.   (ditto, Case 3.)

CASE 41.—Craniotomy after version ; rupture of uterus. (See Craniotomy, Case 5.)

CASE 42.—Craniotomy, and post-partum hæmorrhage. (See Craniotomy, Case 12.)

CASE 43.—Craniotomy after version, with laceration of vagina and uterus.   (See Craniotomy, Case 3.)

CASE 44.—Craniotomy.   (See Laceration of uterus and vagina, Case 2.)

Deformities of the Children.

CASE 1.—Malformation of head (not specified), and peculiar formation below sternum.

CASE 2.—Harelip (simple).

CASE 3.   ditto

CASE 4.   ditto, with cleft palate.

CASE 5.   ditto   ditto

CASE 6.   ditto   ditto, harelip operated upon successfully five days after birth.

CASE 7.—Anencephalous, lived six hours.

CASE 8.—Hydrocephalic head.

CASE 9.—A twin ; right leg deformed (no particulars).   Imperforate anus.   Testes undescended.   Lived ten minutes.

CASE 11.—One leg perfectly straight ; no knee-joint. Talipes equinus : spina bifida ; bones of head imperfectly developed. Lived two hours.—The grandfather had club feet and three fingers of left hand webbed.

Varieties of circumstances attending the birth.

Two children were born wholly enveloped in membranes.

One child was born with its abdomen distended with fluid.

One was born dead with hypertrophy of liver and peritonitis.

One was born with morbus cæruleus ; died next day.

One was born before assistance arrived, strangled by the funis drawn tightly round its neck.

One born alive, with the funis four times round the neck.

Notes on the child after delivery.

One child died of erysipelas (not stated where) ; another died of diffuse phlegmonous inflammation round the umbilicus ; and a third two days after birth from jaundice.

ON

THE TREATMENT

OF

GRANULAR CONJUNCTIVITIS

BY

INOCULATION WITH PUS.

By C. BADER,

OPHTHALMIC ASSISTANT-SURGEON.

This paper is the result of a series of cases of granular conjunctivitis (*syn.* granulations, granular lids, granular ophthalmia), with and without pannus, which I had the opportunity of treating at Guy's Hospital and at the Royal London Ophthalmic Hospital, Moorfields. From October, 1857, to March, 1864, about 157 cases (240 eyes) were treated by inoculation.

The youngest of the patients was 12 years old, the oldest 63; the age of about one tenth of the cases was between 12 and 20 years; that of five tenths between 20 and 30, that of three tenths between 30 and 40, and that of one tenth between 40 and 63.

Of the above cases, 42 contracted granulations in the army (in India 24, Cape 2, China 6, West India 2, Gibraltar 2, Corfu 1, Crimea 2, Aldershot 1, Woolwich 2); of the remainder, 49 contracted granulations in London; 67 of the cases were of undoubted Irish origin.

The treatment of granular conjunctivitis and of pannus by inoculation of gonorrhœal matter was, I believe, first practised in the Austrian army about 1812; many cases were

cured; many were not improved, or even lost the sight they had. The severity of the inflammation set up by inoculation, and the unfavorable result of some of the cases, prevented many from the employment of this treatment. Some theoretical notions induced me to try the treatment, with a hope of finding a mode of inoculation which renders it more safe and applicable to the slighter cases of granular conjunctivitis. Before entering upon the result of the numerous cases treated I will give a short account of the different groups of cases treated by inoculation, of the mode of inoculating, and of the treatment of the above cases.

Mode of inoculation.—A small quantity (a drop) of the pus to be used for inoculation is placed with the tip of the little finger upon the conjunctiva of the lower lid of the eye which is to be inoculated, and is left there. The pus should be transferred from the person (child, &c.) from which it is taken while fresh. Pus, dried, will no more produce an effect. Experiments are made at the Hospital at present by Mr. Henry Brietzcke, one of the assistants at the eye department, as to the possibility of preserving different kinds of pus in tubes. The kind of pus which is supposed to produce a mild kind of suppuration is easily enough obtained at a large hospital, but not so, perhaps, in military hospitals, where granulations are most prevalent. The object of the above experiments is to supply others with any pus desired. The fluid which surrounds the pus-cells seems essential for producing suppuration of the inoculated conjunctiva.

If only one eye be inoculated, the fellow-eye must carefully be kept closed; it may be untied once a week to wash it, taking care to bind it up again; the least particle of discharge from the inoculated eye would be sufficient to set up purulent ophthalmia. This can always be arrested if treated at the commencement.

The following seemed the most effectual mode for keeping the not inoculated eye closed and secure from risk of accidental inoculation. A thick layer of Canada balsam or gum mastic was spread over the skin of the eyelids, then wadding was laid on to the level of the bridge of the nose and margin of the orbit, and retained in position with a light bandage or strapping.

Treatment of the inoculated eye.—It consisted in cleanliness, by washing away the discharge from the eyelids with tepid water every hour, if the pain was very severe; twice a day (morning and evening), if there was moderate or no pain. Washing the eyes twice a day suffices as soon as the acute stage of suppuration has subsided. In severe cases of pannus it seemed desirable to obtain abundant suppuration; the purulent discharge was, therefore, not washed away for one or two days after suppuration had commenced. The lids becoming glued together, the pus accumulates upon the conjunctiva, and seems to occasion a more abundant discharge.

The unsatisfactory results obtained by some persons from inoculation seem in most cases to be due to a desire to check the purulent inflammation. A treatment which tends to check the inflammation (suppuration) arrests the destruction of the pannus, and of the substance which helps to form the granulations, and leaves the case in as bad, or in a worse, condition than it was before inoculation. Perforations of the cornea and changes in the eyelids were not specially attended to while the purulent discharge continued. A case was considered cured when the granulations were destroyed, the palpebral conjunctiva having assumed its smoothness. Operations for artificial pupil, changes in the conveyance of tears, distortions of the lids, should never be attended to as long as the granulations are not destroyed; the latter frustrate all attempts to improve vision, &c. &c.

All cases of granular conjunctivitis can be cured by inoculation; but if the entire or part of the cornea be transparent, the difficulty arises of producing such a suppuration as will destroy the granulations without leading to destruction or perforation of the cornea. In such cases one has to select the pus, taking it from purulent ophthalmia of children of a mild form. All cases of granular lids might be cured by pus from a gonorrhœa if some means of protecting the cornea were found. Those who adopt the treatment by inoculation ought to be familiar with what are called granular lids. Minute red granulations, giving the palpebral conjunctiva a red velvety appearance, must not be treated by inoculation. The large red, or gray red, or gray or yellow and opaque granulations, are those which will disappear when inoculated.

The term vascular cornea or pannus is applied to a cornea the surface of which is more or less overrun by blood-vessels passing upon it from the ocular conjunctiva. It is one of the results of the morbid action set up upon the cornea, by the contact of the granulations of the conjunctiva and of their secretions. The cicatrices in the conjunctiva caused by scarifications become much smoother and less conspicuous.

In cases where one cornea is vascular throughout, the other transparent in part, both eyes ought to be inoculated, since it has happened that the cornea of the worst eye became transparent and the granulations disappeared, but returned, the secretion from the uninoculated fellow-eye coming again in contact with the inoculated conjunctiva. It is better to cure the granulations in both eyes, to risk one eye and to have one good eye, than to render one cornea transparent, finally to have to inoculate the fellow-eye, and possibly have the cured eye re-inoculated and lost. If both cornea are opaque and vascular, both eyes may be inoculated, and the patient may be treated as out-patient, informing him of the contagious property of the pus. If one eye is bound up, or if a case is inoculated where part of the cornea or the whole of it is transparent, it ought to be kept in the hospital until the chronic stage of suppuration has set in.

The duration of the acute suppuration lasted from three days to six weeks; the chronic suppuration from two to eighteen months. Some cases got well in two, others after eighteen, months, cleanliness being the *sole* treatment.

The symptoms of the acute stage of suppuration commence from three hours to two days after inoculation; they are itching, increased watering, photophobia, then redness and swelling of the eyelids, with chemosis and purulent discharge, reaching sometimes a very high degree, the pus streaming over the patient's cheeks for days; the cornea becomes more vascular, its surface becomes yellow; opaque portions of the vascular webb on its surface slough away, its curve remaining generally unaltered. The pain is sometimes severe, preventing sleep for several nights. If it increases three to four days after the acute stage has set in, a perforation of the cornea is threatening; the acute symptoms gradually subside, the pain

generally first. The acute stage is supposed at an end as soon as the patient opens the eyelids spontaneously.

The cases treated by inoculation are arranged into groups. For numerous cases, taken from the different groups, see the second number of the 'Royal London Ophthalmic Hospital Reports' for 1864. The following groups were treated:

GROUP 1.—Cases with very protruding eyeballs; the palpebral conjunctiva granular; the cornea opaque in the centre, translucent at the periphery, and overrun by blood-vessels. Vision—not able to guide themselves. Inoculated with pus from purulent ophthalmia (infantile). The patients recovered vision to follow their employment.

GROUP 2.—Cases without granular conjunctiva, but with numerous adhesions of the ocular to the palpebral conjunctiva, with cicatrices in the latter; the cornea either destroyed in part or nebulous throughout. The conjunctiva in these cases seems, as to its follicular apparatus, to have been destroyed, either by caustics or by the preceding changes of the granulations, or by both together. No bad nor any favorable result was obtained by inoculation.

GROUP 3.—Cases of xerosis. The surface of the cornea dry, smooth, articular, and opaque; the conjunctiva dry, atrophic, shortened, anæmic. No effect was produced by any kind of pus.

GROUP 4.—Cases with the cornea grayish translucent; no pupil visible; the palpebral conjunctiva vascular, thickened, overrun by cicatrices, interspersed with few granulations. The granulations were destroyed by the effects of the inoculation, the cornea became clearer, the cicatrices in the conjunctiva much less conspicuous.

GROUP 5.—Cases where one or both eyes were lost by granular ophthalmia, and where the palpebral conjunctiva was covered with granulations. These gave the patients much trouble; they were readily destroyed by inoculation. Pus from acute purulent ophthalmia (infantile) seems the most suitable.

Group 6.—Cases where the granular ophthalmia had led to a staphylomatous condition of the uneven, vascular, and opaque cornea, with granulations upon the palpebral conjunctiva. The granulations were cured by inoculation with pus from infantile purulent ophthalmia; the staphyloma was arrested.

Group 7.—Cases with more or less large, superficial ulcerations of the cornea, superadded to the pannus and the granular ophthalmia. The ulcers rapidly healed during the changes following inoculation.

Group 8.—Cases with anterior synechiæ, and with traces of perforation of the cornea, which probably occurred during the course of the granular ophthalmia. The granulations were destroyed by inoculation; the peripheral parts of the cornea became transparent; the portions which had been the seat of perforations remained opaque.

Group 9.—Cases with pannus and granulations, and with considerable chemosis and moderate purulent discharge. But for the state of the cornea, these cases resemble a mild gonorrhœal ophthalmia. They were cured by inoculation.

Group 10.—Cases where the centre of cornea was densely opaque (leucomatous); the periphery, though overrun by blood-vessels, transparent; the palpebral conjunctiva granular. Cured by inoculation.

Group 11.—Cases with the centre of the cornea opaque, the periphery transparent, its surface uneven and vascular; the palpebral conjunctiva not covered with large red, but with very small red, granulations, giving its surface a velvety appearance. These cases should not be treated by inoculation.

Group 12.—Cases with the substance of the cornea transparent, the surface hardly nebulous, but overrun by blood-vessels; the pupils well seen. Vision—tell the time on a small watch. These cases suppose a thorough acquaintance with the different kinds of pus. A pus taken from a very

mild form of infantile purulent ophthalmia will cure the cases ; but those who are not in the habit of inoculating had much better treat the cases with caustic, or wait until the pannus is further advanced, and hides the pupil from view.

GROUP 13.—The surface of the cornea ulcerating and vascular, but the cornea otherwise transparent, and the pupil well visible. The same remark as to treatment applies to this group.

GROUP 14.—Cases with granular conjunctiva, the cornea being transparent. Cases of this kind have been cured by inoculation ; but before knowing more about the properties of pus, I should advise to treat these cases by caustics, warm applications &c., &c.

GROUP 15.—Cases with granular conjunctiva, the surface of the cornea being uneven, overrun with blood-vessels ; its upper half (the one which more or less is in contact with the granulations of the conjunctiva of the upper lid) nebulous, its lower half nearly or quite transparent. These cases, unless the proper kind of pus can be obtained, should either be treated by the application of caustic, or the eyelids of the eye which one proposes to inoculate should be kept closed ; the whole cornea is thus likely to become nebulous and vascular more rapidly, when any kind of pus taken from infantile purulent, ophthalmia may be used for inoculation. This is a difficult group of cases to treat ; the patient sees sufficiently to guide himself sometimes to do ordinary work. The treatment, except by inoculation, protracts itself over many months, while, when inoculated, the lower transparent portion of cornea is likely to become perforated. Even this, if the perforation is small, and the cicatrix level with the curve of the cornea, and if the remainder of the cornea is made transparent, is preferable to the treatment by caustic, &c., which, besides the frequent relapses of the granular ophthalmia, is painful and tedious to the patient and the medical man.

GROUP 16.—Cases with the entire cornea vascular and nebulous, the pupil being faintly visible, the conjunctiva granular. The granulations of all these cases were cured. The vision was improved in four fifths of the cases.

Group 17.—The character of the cases is the same as of those of group 16, the cornea being more opaque, and vision consequently more impaired.

Group 18.—Cases with the cornea covered by a yellow, opaque, granular substance; no pupil visible; bare perception of light. Gonorrhœal pus is the best for these cases; though the worst in appearance, they are the most satisfactory in the end. If left alone as long as there is any suppuration, they will do well.

For those who keep notes of their cases of inoculation, or who wish to improve the present mode of note-taking, I subjoin the headings of a synopsis, which I composed for my use.

1. No., date. 2. Name, age, address. 3. Occupation or regiment. 4. General habitus. 5. Contracted granulations, where? 6. Cause given by the patient. 7. Duration of the disease (of the granulations) previous to inoculation. 8. Treatment previous to inoculation. 9. Present state of vision of right (R), left (L), of both eyes (B). State of the palpebral conjunctiva, whether granular, cuticular, covered with cicatrices; of the fornix (the fornix of the conjunctiva is that portion which passes over from the eyelids to the eyeball); of the ocular conjunctiva; state of the cornea, of its surface, of its substance, of its upper, lower half, of its curve; pupil visible, or not. State of the eyelids—whether trichiasis, in- or eversion, tinea, displacement of puncta. Secretions—whether pus, tears. Photophobia. 10. Date of inoculation—which eye? what kind of pus? Describe carefully the age of the pus, the state of the eyelids, and of the conjunctiva of the eye, from which the pus was taken. Notice the time when the first symptoms of the purulent inflammation following the inoculation appeared, and what they are? We distinguish an acute and a chronic stage of suppuration. The acute stage is supposed to cease as soon as the patient is able to open the lids of the inoculated eye spontaneously; its chief symptoms are—red swollen lids, which cannot be raised, chemosis, profuse purulent discharge, sloughing of the vascular web upon the cornea, severe pain in the eye and over the orbital region, in many cases sleeplessness. The chronic stage is at an end as soon as the eyelids discon-

tinue sticking.together when the patient gets up in the morning, and as soon as all granulations have disappeared from the palpebral conjunctiva. 11. Any remarks that may seem interesting during the course of the acute or chronic stage—*f. i.*, the time and nature of the first symptoms of taking, *i. e.* of the commencement of the suppurative inflammation. 12. Treatment of the inoculated and of the not inoculated eye. 13. Result, date, state of vision, of cornea, of conjunctiva. Treatment required (*f. i.*, the operation of artificial pupil) after the disappearance of the granulations.

The cases of each group presented a series of symptoms which, though similar in their general character, varied in degree, in time of duration, &c. When making up the statistical account of each group of cases, its most prominent symptoms and features were discussed. They are the following :— 1. The title of the group, as suggested by the state of the cornea, together with the state of the conjunctiva. 2. Complications—*f. i.*, ulcerations of the cornea of the eyelids, eversion of the latter, &c. 3. Duration of the granulations previous to inoculation. 4. The kind of pus used, and why? 5. Succession of symptoms after inoculation, and how soon after. 6. Does the severity of the pain go parallel with the implication of the cornea into the suppuration? 7. Photophobia. 8. Watering. 9. Swelling and redness of the eyelids, chemosis, suppuration. 10. Changes of the surface, of the curve, and in the vascularity of the cornea. 11. Duration of the acute and of the chronic stage. 12. Result as to vision, as to cornea and conjunctiva. 13. Complications following the inoculations and their treatment.

The observation of a large number of cases necessarily suggests a series of questions, the answers to which I am working out. Some of these questions are—1. What has the duration of the pannus previous to inoculation to do with the result? 2. What has the severity of the case, independent of the duration, to do with the result? 3. Taking similar cases as to duration and severity, does pus Nos. 1, 2, 3, &c., produce different results as to severity of inflammation, length of duration, and as to the changes obtained in the cornea, conjunctiva, vision, &c.? 4. Is there a relation

between the amount of conjunctiva destroyed previously to inoculation and the severity of the purulent ophthalmia following the inoculation?   5. What relation does the duration of the acute and of the chronic stage bear to the kind of pus used for inoculation, to the state of the conjunctiva and cornea, and to the duration of the disease?   6. Does partial or total syndesectomy offer more immunity to the cornea (especially its transparent portions) against perforation?   7. How far does that operation modify the suppuration, the chemosis, and other symptoms following inoculation?

Among different kinds of pus the following were used :— 1. Pus taken from the urethra of a man suffering from gonorrhœa.   1*a*. Pus taken from an eye which had been inoculated with pus 1.   2. Pus from the eye of a child suffering from purulent ophthalmia, its mother having purulent discharge from the vagina at the time the pus was taken from the child's eye.   2*a*. Pus from an eye which had been inoculated with pus 2.   3. Pus from the eye of a child suffering from purulent ophthalmia, its mother having no yellow or suspicious-looking discharge from the vagina at the time the pus was taken from the child's eye.   3*a*. Pus from an eye which had been inoculated with pus 3.   4. Other kinds of pus—*i. e.* from catarrhal ophthalmia, from ophthalmia following operations, &c.

MEDICAL PREPARATIONS OF ARSENIC.

By S. O. HABERSHON, M.D.

THE sulphurets of arsenic have been used in medicine since the time of the earliest physicians, and primarily in the treatment of elephantiasis. In the first London Pharmacopœia white arsenic is also mentioned in the materia medica. In the editions of 1757 and 1788 arsenic was omitted, till that of 1815, when, in the form of the solution of arsenite of potash—Fowler's solution—it was re-introduced, and since that time it has held an increasingly important position.

Arsenic is said to have been first used as an antiperiodic in Poland, but in the year 1783 Mr. Hughes, of the Stafford Infirmary, found that the tasteless ague drop contained an arsenical substance, and from his suggestion Dr. Fowler was led to form a solution of arsenious acid with carbonate of potash, the formula being identical with the Liquor Arsenicalis of the British Pharmacopœia. After numerous instances proving the value of his solution in the treatment of intermittents, Dr. Fowler published his experience in the year 1786; and although at first, there was great hesitancy on the part of the profession, gradually, confidence in its value was established, and its remedial power is now generally appreciated.

The potash solution of arsenious acid is that which has been most extensively used, and for some years it was the only preparation; afterwards, the solution of arsenious acid in dilute hydrochloric acid, called the solution of chloride of arsenic, was adopted—De Valangin's mineral solution;[1] then the iodide of arsenic alone, or with iodide of potassium, or with iodide of mercury—Donovan's solution; and now in the British Pharma-

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[1] Used by Bateman in lepra, and by Dr. Farre, in chorea.

copœia two preparations of arsenic acid are introduced, the arseniate of iron and arseniate of soda.

These preparations[1] cannot be used indiscriminately, and in some instances greater benefit accrues from the use of the one than the other.

There are three forms of disease in which arsenic is of service :—(1) Miasmatic poisoning ; (2) diseases of the skin ;

[1] *Liquor Arsenicalis, P.B.*—Arsenious acid, gr. 80 ; carbonate of potash, gr. 80 ; compound tincture of lavender, ʒv ; distilled water, to make one pint.

Sp. gr. 1·009.   Each ounce contains gr. iv of arsenious acid.

Dose, ♏ij to x.

Liquor Arsenici Chloridi, P.L.—Arsenious acid, ʒss ; hydrochloric acid, ʒiss ; distilled water, to make one pint.

Each ounce contains gr. iss of arsenious acid.

Dose, ♏iij to x or xv.   A solution of arsenious acid with dilute hydrochloric acid.

Iodide of Arsenic.—Prepared by gently heating in a tubulated retort, placed in a sand bath, a mixture of one part of finely pulverized arsenic and five parts of iodine ; the iodide is afterwards to be sublimed, to separate the excess of arsenic. The compound thus obtained is an orange-red volatile solid.   It is soluble in water, either as teriodide of arsenic, or as a compound of hydriodic and arsenious acids.

$AsI_3 + 3HO = AsO_3 + 3HI$.—*Pereira.*
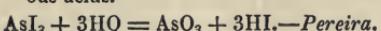
Dose, gr. $\frac{1}{16}$ to gr. $\frac{1}{8}$.

Solution of Iodide of Arsenic and Mercury.—Donovan's solution.   " Arsenic, gr. iv ; mercury, gr. xvj ; iodine, gr. lss ; alcohol, ʒss ; distilled water.   Rub the arsenic, mercury, iodine, and spirit together till a dry mass is obtained, and, having triturated ʒviij of the water with this in successive portions, let the whole be transferred to a flask and heated till it begins to boil.   When cool and filtered, add water to make ʒviij ʒj."—*Neligan.*

Each ʒj contains $\frac{1}{12}$ gr. of oxide of arsenic, $\frac{1}{4}$ gr. oxide of mercury, and $\frac{5}{8}$ gr. of iodine.

Dose, ♏x to xxx.

Arseniate of Soda, P.B.—Arsenious acid, ʒx ; nitrate of soda, ʒviiiss, dried carbonate of soda, ʒvss ; boiling distilled water, ʒxxxv.   Reduce the dry ingredients to a fine powder, and mix them thoroughly in a porcelain mortar.   Fuse in a large clay, covered crucible.   Pour the fused salt on flagstone, and, as soon as solid, put it into boiling water.   Filter the dissolved salt, and crystallize.

Dose of crystals, $\frac{1}{16}$ to $\frac{1}{2}$ gr.

$2NaO, HO, AsO_5 + 14HO$; by heat of 300°, loses 40·38 per cent. of its weight.

Liquor Sodæ Arseniatis, P.B.—Dried arseniate of soda, gr. iv ; distilled water, ʒj.

Dose, ♏iij to xx.

Arseniate of Iron, P.B.—Arseniate of soda, ʒiv ; acetate of soda, ʒiij ; sulphate of iron, ʒix ; distilled water.   Mix the solutions of the salts, collect the precipitate, wash, and dry it.

Dose, gr. $\frac{1}{10}$ to gr. $\frac{1}{3}$.

(3) some diseases of the nervous system; and in the treatment of these some general rules may be laid down for the administration of arsenic.

1. The preparations of arsenic are best given in solution; the medicine can be more accurately measured and its dose better proportioned; in the fluid state they are more readily absorbed, and the action is more efficient.

2. The best time to take the remedy is soon after a meal; for in this way any irritant effect is less likely to occur, and the drug may be increased in quantity, and its use continued for a longer period than could otherwise be the case.

3. If it be desired to give arsenic with quinine, the acid solution in hydrochloric acid will be found to be a convenient form for administration.

4. In states of great febrile excitement, especially when associated with furred tongue, retained excretions, and congestion of the chylopoietic viscera, arsenic is not well borne; and it is well to attempt the removal of these symptoms before commencing its use.

5. In states of great irritability of the stomach and bowels, it is better to postpone its use till those symptoms have been relieved.

6. In diseases of the nervous system having among their symptoms a contracted state of the pupil, with vertigo, arsenic is not generally of service. Thus, some forms of neuralgic pain in the head are greatly relieved by arsenic, but we shall often be disappointed in its efficacy unless the instances be carefully selected.

7. If menorrhagia and dysmenorrhœa be present with maladies in which arsenic might be of service, the former symptoms will often be aggravated by its administration.

8. Although strumous disease does not necessarily preclude arsenical medicines, they are better avoided where much enlargement of the lymphatic glands exist.

9. In acute diseases of the skin, preparations of arsenic are often prejudicial.

10. They are of but little service in true syphilitic eruptions.

11. Disappointment in the efficacy of arsenic has often arisen from the dose not being properly increased, and from the dis-

continuance of the remedy before the disease has been thoroughly cured.

12. Whilst the experience of the profession more than confirms its value in chronic skin disease, in cancerous disease it is regarded as comparatively valueless as an internal remedy, and dangerous as an external one.

13. Although irritability of the stomach and bowels, as well as of the mouth and conjunctiva, may be induced by arsenic, these symptoms do not necessarily compel us to discontinue its use, for a diminution of the dose, and admixture with an opiate, may remove the symptoms.

14. Where very minute and continued doses induce a general sense of exhaustion, with compressibility of the pulse and loss of appetite, although there is no irritation of the mucous membrane of the alimentary tract, the arsenic must for a time, at least, be discontinued.

15. The acid solution of arsenic may often be used very advantageously with the preparations of iron, and in some forms of chronic disease of the skin in strumous subjects the solution of the iodide of arsenic will be found an exceedingly advantageous form of administration, as recommended by Biett,[1] Thomson,[2] Neligan, &c.

16. The arseniates of soda and of iron have been recommended as milder in their action than the arsenites. There is some doubt whether the arsenic acid becomes changed in the system, for in an instance in which the arseniate of soda

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[1] *Iodure d'Arsenic* (Magendie Formulaire) :—

" Le composé a été aussi mis en usage à l'hôpital Saint Louis, par M. Biett.

" Il s'obtient soit; en chaffant dans une cornue de verre un mélange d'arsenic 16 et d'iode 100, l'iodure se sublime sous la forme d'aiguilles d'un rouge orangé. Il se décompose facilement par l'eau en grande quantité.

" Soit; en faisant bouillir arsenic en poudre 30 grammes, iode 100 dans 1000 grammes d'eau, filtrant lorsque la liqueur est encoloré, et évaporant à siccité. On peut le sublimer si on le juge convenable.

" POMMADE.

      " Iodure d'Arsenic   .   .   .   .   .   .   3 gr.

      " Axonge   .   .   .   .   1 once.

" M. Biett a plusieurs fois employé cette pommade dans quelques cas de dartres rougeantes tuberculeuses."

[2] An interesting paper on " Iodide of Arsenic," by Dr. A. T. Thomson, is to be found in the 'Lancet' of 1839, p. 176. He used the iodide in lepra, chronic impetigo, in doses of $\frac{1}{8}$ of a grain, so also in tumours of a carcinomatous kind.

was given for several days, Dr. Stevenson could detect none of the peracid in the urine.

Ague.——Although in the treatment of intermittent fever arsenic is inferior as a remedy to quinine, still there are instances when, quinine having failed, arsenic will effect a cure. Two years ago an unusually large proportion of cases of intermittent fever presented themselves at Guy's Hospital ; and in many of these poor patients, although the paroxysms were checked, still there were occasional paroxysms or profuse perspirations which were greatly benefited by arsenic. It was frequently found that the circumstances of the patient were adverse to a speedy recovery, although special care was given to correct disordered conditions of the abdominal viscera. The addition of arsenic to quinine will, in some obstinate cases of intermittent fever, be found very serviceable ; and in these instances the acid solution of arsenic, the chloride, will be found to be a convenient mode of administration. When given alone, the arsenite of potash——Fowler's solution——is, perhaps, preferable.

Neuralgia.——The benefit of arsenic is not confined to cases of miasmatic neuralgia, and some instances of intense pain, arising from organic disease, are often relieved by this means ; here also, especially when the patient is anæmic, the combination with iron is exceedingly efficacious——the tincture of iron, in doses of 15—20m, with 3 to 5 of the solution of chloride of arsenic. In the treatment of many functional diseases of the nervous system arsenic has been of great service ; thus, in chorea, although we regard it as less valuable than sulphate of zinc, many give it a prior position, and in epilepsy the paroxysms are often thereby greatly diminished in frequency ; and in these cases also we have found more benefit from the combination of iron with the arsenic than from either remedy alone. We refer especially to some instances of severe epilepsy in young anæmic women, with scanty menstruation. In nervous exhaustion, after great anxiety, as shown by tremor, compressible pulse, similar good results follow the internal administration of arsenic with steel.

Arsenic is one of the most valuable medicines we possess in the treatment of *chronic cutaneous* disease,[1] as chronic lichen,

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[1] See works by Bateman, Biett, Rayer, Hunt, &c.

chronic eczema and impetigo, chronic lepra and psoriasis, lupus, &c.; and every writer upon these maladies has testified to its efficacy. Where there is inflammatory action about the diseased part, we have generally preferred the solution of the arsenite of potash, with the addition of bicarbonate of potash or the iodide of potassium.

Where there are signs of anæmia we have often used the tincture of the chloride with tincture of iron; and although irritation of the stomach has in some cases been quickly induced, we have found it an efficacious combination.

In the lepra of strumous subjects and lupus non exedens the plan mentioned by Neligan, of combining the solution of arsenite of potash with iodide of potassium, is a very good one; but more frequently we have used a solution of iodide of arsenic. In several cases of lepra, of chronic lichen, and of lupus, its use has been followed by speedy subsidence of disease, and it is well worthy of trial. The iodide of arsenic was first recommended by Dr. A. T. Thomson; both in lepra and impetigo, and in cancer. It is a form of the remedy well borne; and although incompatible with acids, and decomposed by them, may be given with alkalies. In an instance of lupus non exedens lately under my care the disease rapidly healed under its use. The patient was fifty-one years of age, and the disease had lasted about a year. The iodide was continued for more than two months without any constitutional disturbance, and similar beneficial results have followed in several cases of severe lepra vulgaris. The strength of the solution that I have used has been the same as Fowler's solution, and was prepared for me in the following manner by my colleague Dr. Stevenson:

" Various methods suggested themselves for the production of an iodide of arsenic. Iodide of potassium and iodide of ammonium were mixed with strong sulphuric acid, and the mixture distilled in a glass retort. Though an analogous method readily yields chloride of arsenic, this general method failed to produce an iodide of arsenic capable of being used in medicine. This arises from there being several compounds of iodine with arsenic, all of which are, however, of uncertain composition, and readily decompose into other per- and sub-iodides. In this case large quantities of free iodine and traces

of arsenic passed over into the receiver, whilst a brick-red mass of crystals was left in the retort. These crystals were found to be a mixture of several iodides, and to be of uncertain composition; moreover, they were decomposed by a heat of 212° Fahr. A method was at length tried which appears to procure an iodide of arsenic fit for medical purposes. Hydriodic acid was perfectly freed from all free iodine by means of a current of sulphuretted hydrogen. This was filtered, and digested with arsenious acid till it would take up no more. This was filtered off from the undissolved arsenious acid, and was found to be colourless. The amount of arsenic was then determined in a known quantity of this fluid, which was then diluted till it contained the same per-centage of arsenic as the Liquor Arsenicalis, P. B."

Dr. Neligan recommends an additional quantity of iodine to be used in the solution of arsenic with iodide of potassium, and in some instances this may be advantageous. In the British Pharmacopœia two salts of arsenic acid are added. Still, we think that the solution of arsenic in hydrochloric acid, although it may not be a true chloride of arsenicum, might very properly have been retained. Other combinations of arsenic have often been given with benefit, and the form directed in Donovan's solution—the solution of the iodide of arsenic with iodide of mercury—has been found in the hands of many as a most efficaceous combination in the treatment of chronic cutaneous disease, modified by syphilis.

TWO CASES

DISEASE OF THE SUPRA-RENAL CAPSULES

WITH

BRONZING OF THE SKIN.

By S. O. HABERSHON, M.D.

In the Hospital 'Reports' for 1862, Dr. Wilks has given a valuable summary of the symptoms and course of disease of the supra-renal capsules; and the two following instances so fully confirm the observations previously made by Dr. Addison and others, that we have thought them deserving a place in the records of the hospital practice.

Although the instances which have been generally detailed have terminated fatally, there are numerous cases, closely allied to those of disease of the supra-renal capsule, which recover under proper treatment. The more fully that the disease is known, the more completely is the disease traced to the vaso-motor nerve. The sickness, exhaustion, compressible pulse, and failing power of the vital functions, are not peculiar to this disease of the supra-renal capsules; and even discoloration of a very similar kind is found in other maladies. Thus, in the exhaustion from long-continued lactation, there is great weakness, a compressible and irritable pulse, disturbance of the stomach, and very frequently patches of discoloration are seen about the forehead and face, as well as on other parts of the body. Here the vaso-motor nerve and the whole cerebro-spinal system of nerves are affected from exhausted uterine function; but the cause is a removable one, and the disease is therefore

remedial ; but in extensive deposit in the supra-renal capsule, the sense of irritation and exhaustion to the vaso-motor nerve is persistent, and consequently the malady is progressive.

In some instances of syphilitic cachexia there is general discoloration of the skin, with great exhaustion, but the disease is curable.   Two years ago I had a patient under my care with many of the symptoms of disease of the supra-renal capsules, with general bronzing of the skin, especially about the face ; exhaustion, irritability of the stomach, and compressibility of the pulse, &c., also existed.   After a time, periosteal nodes were detected upon the shins, and, under the use of iodide of potassium, not only did the nodes disappear, but the general symptoms were relieved, and the patient left the hospital well.

This patient has subsequently been under my care at Guy's Hospital, and with the same beneficial result.

The *anatomical* relations of the supra-renal capsules show the closest connection with the vaso-motor nerve ; in one of my dissections published in the ' Guy's Report ' of 1856 several branches from the semilunar ganglion could be traced to the gland, and one branch passed through it, again joining the ganglion.   In fig. 1, Plate II, a branch of the vaso-motor nerve is seen to dilate in a gangliform manner in the gland, and other branches connect this enlargement with the large semilunar ganglion.   These filaments to the supra-renal capsule proceed from different parts of the semilunar ganglion, as if to bring it into more general relationship.   In the second case now given the dissection of the nerves showed that they were involved in the disease ; several were spread out upon the supra-renal capsule, and dense fibrous tissues surrounded them.   Thus, the anatomical arrangements confirm the view now generally entertained of the pathological symptoms.

A branch of the pneumogastric nerve may also be traced to the supra-renal capsule (fig. 11, Plate II), and the irritability of the stomach is probably due to this cause.   The disturbance at the peripheral extremity of the nerve leads to radiation of irritation to other structures supplied by the same nerve, in the same manner as we find gastric symptoms arising from mischief involving the peripheral branches of the pneumogastric in the lung, or bronchial symptoms from irritation of the branches supplied to the stomach.

CASE 1.—*Melasma, supra-renale* (see Plate I).—Harriet
R—, æt. 19, was admitted under my care into Guy's
Hospital, on September 23rd, 1861. For about two years
she had suffered from slight pain at the stomach and
from sickness, with gradually increasing weakness. The skin
had become darker than usual, so that when brought to
Guy's she had the appearance of a mulatto. Menstruation had
become irregular, and had intermitted for six months. Her
weakness had so increased that she had been unable to con-
tinue her work as a dressmaker. Her mind was clear and in-
telligent, but she suffered occasionally from headache; she
slept tolerably well, and did not suffer from any pain in the
back or legs; she was not emaciated, but had somewhat gained
flesh; the appetite was good; the bowels regular; the pulse
feeble and compressible; the tongue was clean, and there was
deposit of pigment on the gums. There was no evidence of
organic disease in the chest or abdomen. As generous
a diet as she could take was ordered, and ammonio-citrate
of iron with carbonate of ammonia was prescribed. She
remained in the hospital till November, and left unrelieved
as to her general state. Mr. Charles Webb, of Basingstoke,
has been kind enough to send me the following report of the
symptoms and post-mortem inspection :—" On her return from
the hospital she was not improved in the colour of the skin.
From that time she became gradually so dark that the hands
and some parts of the body in patches about the waist and
neck almost resembled a negress. For the last eighteen months
she had been gaining in weight and size, and became plump
and fat. She occasionally complained of lassitude and debility.
Appetite good, slept well, bowels regular, so also the catamenia.
About twelve months ago purpura appeared about the lips,
gums, tongue, and roof of the mouth, but there was no dis-
charge of blood. About a month ago she complained of more
than usual weariness and of a dull pain on the right side of
the abdomen, near the umbilicus, with occasional headaches.
On Wednesday, April 27th, 1864, she was taking tea with a
friend, and was suddenly seized with a severe pain in the head;
in a short time she became drowsy, and gradually insensible.
She remained insensible until death, at 4 a.m. on Saturday,

April 30th, evidently from effusion of the brain. No albumen was ever discovered in the urine."

Mr. Webb had great difficulty in obtaining an inspection, and was not allowed to open the head. He very kindly sent me the left kidney and supra-renal capsule, with one of the thickened Fallopian tubes, and an atrophied ovary.

Post-mortem inspection.—"Externally, the body was well and full formed; the skin was almost as dark as a negress. On cutting through the integument, the fat on the abdomen was an inch and a half in thickness, and of a yellowish colour. *Chest*—The lungs were normal. *Heart*—Small, covered with a good deal of fat. Stomach and intestines were normal. Liver healthy, with peritoneal adhesions, both on the convex and concave surfaces. Gall-bladder full, no gall-stones. Spleen large, very soft, peritoneal adhesions on its surface. Uterus healthy. Ovaries, when removed, were long (two inches) when pulled out, resembling a piece of knotted cord, and hard, as though malignant disease had been set up. *Kidney*—The capsule on the right side was not so large as the left, but affected in a similar manner." The left kidney was large and healthy. The supra-renal capsule was wholly destroyed; no healthy structure was left, but a small mass of white, low-organized product was surrounded by dense tissue; fatty and semi-cretaceous substance replaced the normal structure. Under the microscope, fibroid tissue, imperfect cell growth, and highly refracting granules, were observed. The dense tissue around the ovary and Fallopian tube was of a fibroid character; no heterologous product was present. The ovary was atrophied.

In this instance the symptoms of disease and the discoloration of the skin were well marked. There was gradually increasing prostration, with some irritability of the stomach; the exhaustion became extreme, without corresponding emaciation; and after several years of great weakness, sudden insensibility came on, and on the third day the patient died.

Although the head was not examined, and so far the inspection was imperfect, still the existence of the precise form of mischief that was diagnosed—the degeneration of the supra-renal capsules—is a strong confirmation of the opinions we have formed from other cases that have previously come

under our own care. The thickening about the ovaries and Fallopian tubes was evidently the result of old inflammatory adhesions and thickening.

Case 2.—*Diseased supra-renal capsules ; melasma.*—Edward G—, æt. 18, a bookbinder, who had resided at Islington, was admitted into Guy's Hospital, September 9th, 1863, under my care.

At the Christmas of 1861 he had an abscess in the neck from disease of the glands ; discharge took place, and his health failed from that time. His skin had gradually assumed a deep mulatto tint, and his strength lessened ; there had been slight irritability of the stomach, but neither cough nor diarrhœa had weakened him. On admission, the skin was generally of a deep colour, but in some parts it was nearly black ; thus, on the neck there were two almost black, narrow rings ; the axillæ also were dark. He was a spare young man ; the brain was clear, neither had he headache nor disturbance of the senses. The respiratory sounds were feeble, but there was no dulness on percussion, no cough, and no dyspnœa. The sounds of the heart were feeble, the pulse was compressible. The abdomen was contracted, the appetite tolerably good, and there was no vomiting. There was slight abnormal deposit of pigment on the lips. His only complaint was a sensation of great weakness. He was ordered quinine gr. ij, with sulphate of iron gr. j, cod-liver oil, and full diet, with eggs, &c. The cod-liver oil could not be taken, and set up irritability of the stomach, which with difficulty was quieted. Carbonate of ammonia, with tincture of bark, was then given, and wine or brandy as he could take them ; but the irritability of the stomach repeatedly recurred, and the prostration increased ; he sank on October 28th.

On inspection.—The pleuræ were healthy, so also the lungs, with the exception of a single small nodule of opaque, low-organized product (tuberculous). The heart was small. The abdominal viscera were all healthy except the supra-renal capsules ; no disease of the liver, spleen, kidneys, pancreas, or intestine, existed ; both supra-renal capsules were extensively diseased, and there was scarcely any healthy structure left in them. The left capsule was greatly enlarged, and infiltrated

with low-organized product; in some parts this deposit was cheesy, in others calcareous; the enlargement extended towards the semilunar ganglion, and the branches of the nerves, as well as the ganglion itself, were surrounded with an unusual quantity of dense fibrous tissue. The right capsule was affected in a rather less degree, and the nerves could be traced to it more easily. On microscopical examination of the sympathetic ganglion, no alteration could be detected in the ganglionic cells; they contained a large quantity of pigment and the deposit in the supra-renal capsules contained highly refracting granules and imperfect cell product.

The symptoms in this case were very definite in their character; the discoloration of the skin, the gradually increasing prostration, without evidence of organic disease of any vital organ, and the irritability of the stomach, fully bore out the description which Dr. Addison has given of this disease. Life appeared to cease from simple exhaustion.

The vomiting was, we believe, due to irritation of the branches of the pneumogastric nerve supplied to the gland, and the excessive prostration to the extension of disease to the branches of the semilunar ganglion; the dissection of the supra-renal capsules presented some of the larger nerves spread out upon the capsule, and they were surrounded by dense fibrous tissue. (See dissection and drawing in the museum of the hospital.)

In the instances of bronzed skin it would be well always to notice the relation of the degeneration of the supra-renal capsules with these important nerve structures; for whatever may be the function of these peculiar glands, they are intimately connected with the pneumogastric nerves, and with the large semilunar ganglion of the vaso-motor nerve.

Two plates illustrating Dr. Habershon's Cases of Disease of the Supra-renal Capsules.

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PLATE I. Is the portrait of the girl whose case is described as Case 1. The drawing was made when she was in the hospital, more than three years before her death, and was catalogued amongst the cases of melasma supra-renale.

Fig. 1. Represents the face.

Fig. 2. The back of the hand, which was almost black over the joints.

PLATE II. Shows the nervous connections of the supra-renal capsules.

Fig. 1. Represents the semilunar ganglion, with a nerve passing to the supra-renal capsule, where it dilates in a gangliform manner; there are also other branches passing into the capsule.

Fig. 2. Represents a portion of stomach, with the branches of the pneumogastric nerve proceeding from it to the semilunar ganglion and to the supra-renal capsules. This affords an explanation of the irritability of the stomach in disease of the capsules.

Plate.

64

Fig.1.

Fig 2.

Plate II

Fig. 1

8^{42}
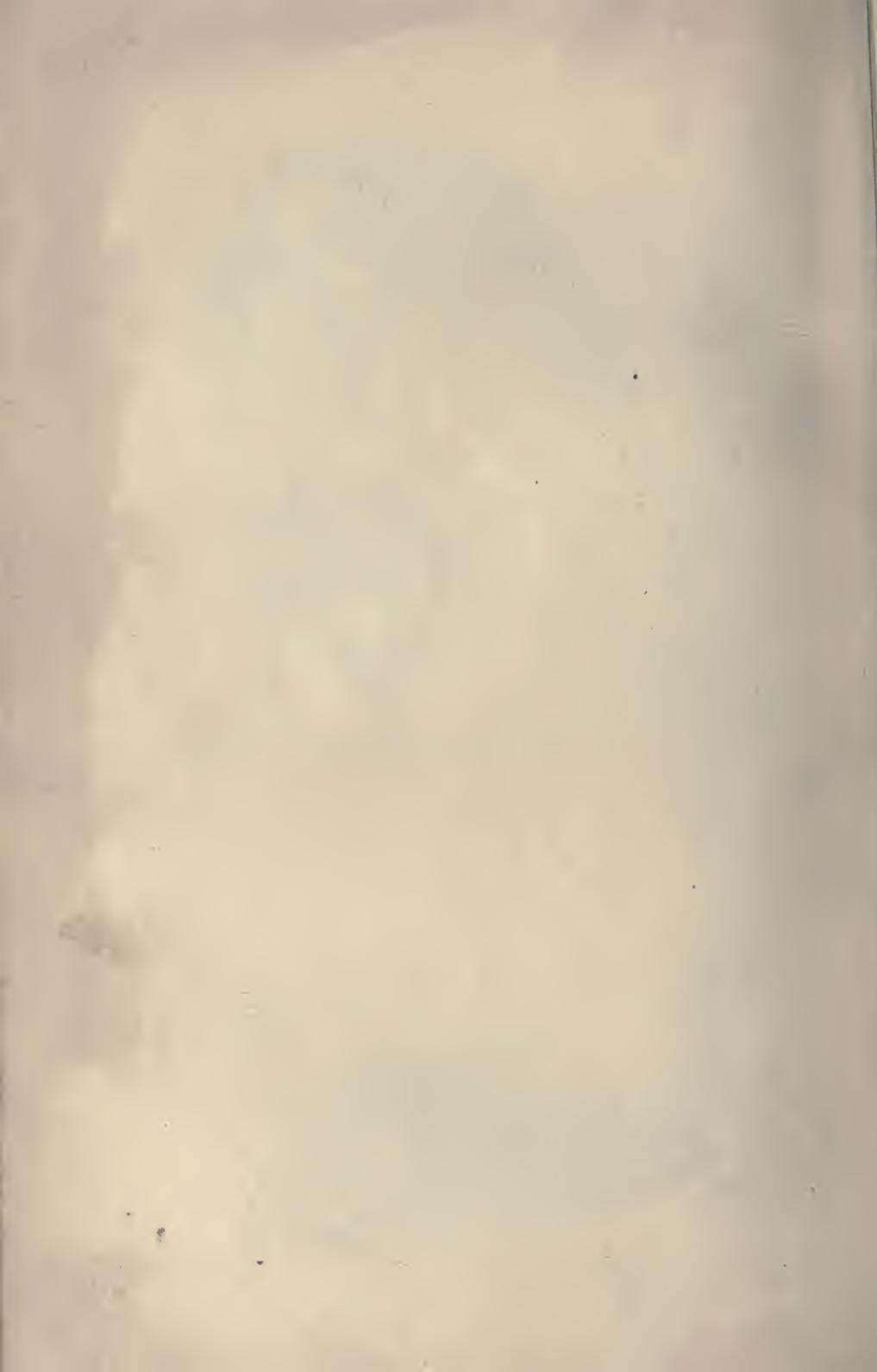
Fig. 2
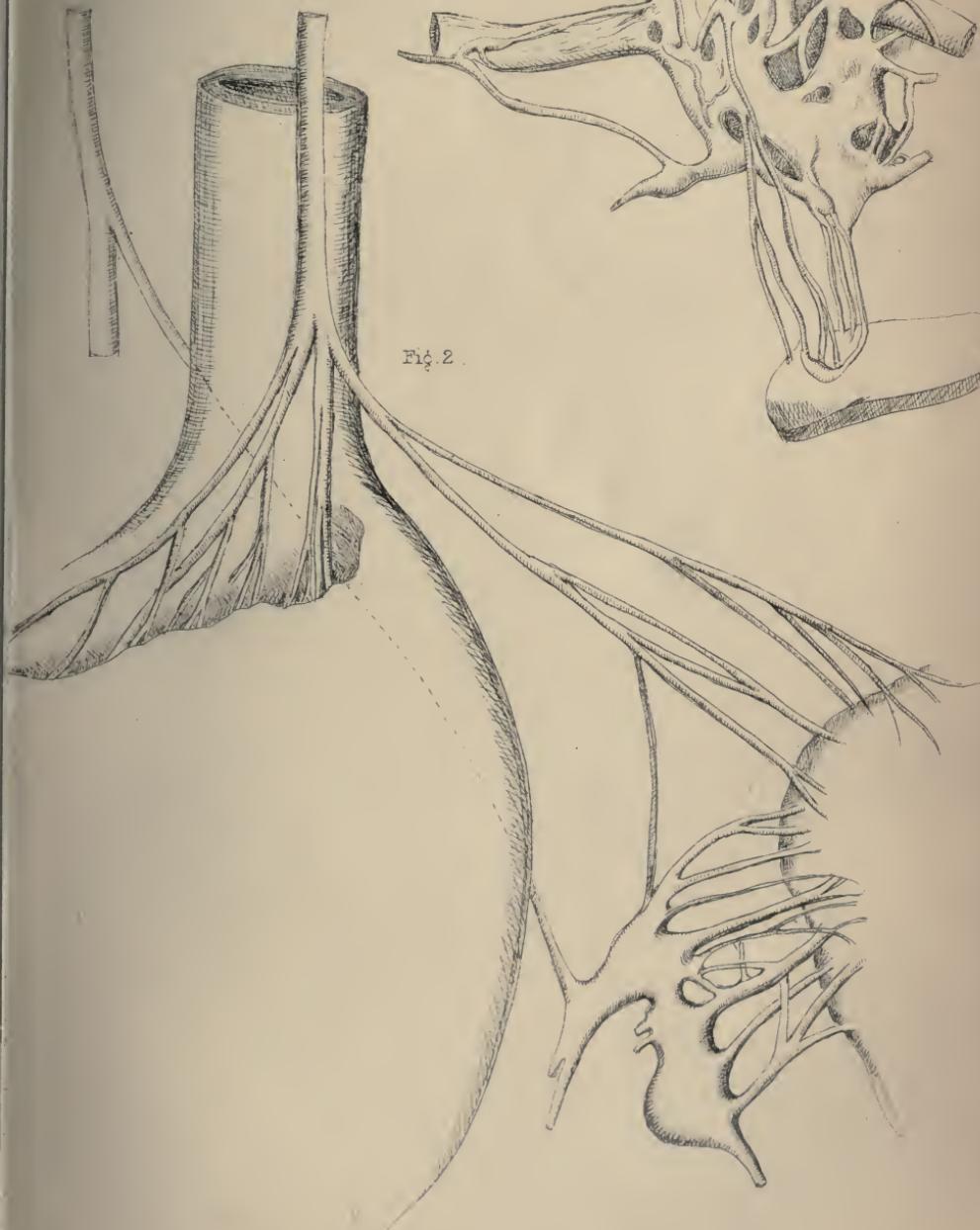
CLINICAL REPORT

ON

INFLAMMATION AND TUMOURS OF THE BREAST,

MORE PARTICULARLY IN REFERENCE TO THEIR DIAGNOSIS.

By THOMAS BRYANT.

THE diseases of the breast have ever been subjects of great interest to the practical surgeon, while to the student they have always presented many difficulties, for it has only been within the last few years that their true pathology has been understood and the value of special symptoms duly appreciated.

To understand correctly the meaning of any single symptom, it is necessary to know the manner in which it has been produced; and to estimate with accuracy the value of a combination of symptoms, it is essential that sound pathological knowledge should go hand in hand with close observation; for the diagnosis of a tumour of the breast is not to be determined by any definite pathognomonic symptom, but by the presence or absence of many; the value of the evidence of any individual symptom depending on its association; and the combination of many alone guiding the surgeon with any accuracy to a right conclusion.

In the following pages I propose to consider briefly the subject of inflammation of the breast, and then to pass on to that of tumours, bearing in mind the fact that the same pathological principles which have been already laid down in former chapters of these reports, as applicable to tumours generally, are of equal value when applied to the tumours

of special parts, such principles being alone modified by the
peculiar anatomical conditions of the tissues in which these
growths are developed.

CHAPTER I.

INFLAMMATION OF THE BREAST.

In the present chapter I propose briefly to consider the
subject of inflammation of the breast, regarding it purely
from its clinical aspect, and to dwell upon such practical
points as the materials before me may suggest, noting only
the more prominent facts which bear upon its pathology,
diagnosis, and treatment.

It is scarcely necessary for me to discuss the question as
to the true seat of the inflammation which attacks the breast,
for there is fair evidence to prove that it may begin in
the gland itself, as well as in the cellular tissue which con-
nects it with the integument or with the muscles beneath.
It may primarily involve the connective tissue which exists
between the lobules as well as the true secreting structure of
the gland.

It may exist as an isolated phlegmonous inflammation, or
be of a more diffused nature. It may, if arrested, be there-
fore limited in its nature, or it may go on to involve in
various degrees of severity the whole of the tissues which
help to build up the true breast.

It may be acute or chronic in its nature, and, like in-
flammation in other parts, may disappear without any
breaking up of tissue or suppuration, or it may be attended
with most destructive local results, the extent of destruc-
tion of tissue depending upon the severity of the inflamma-
tory process, and the amount of constitutional power of
the patient who is the subject of the disease. As a rule,
however, it may be stated that suppuration takes place. The
treatment of the case necessarily has an important influence
over the result; but of this more will be said as we proceed.

As a general rule, it may be asserted that inflammation of the breast attacks the gland when in a state of activity, and that it is exceptional for the passive organ to be the subject of this process ; women who are either pregnant or suckling are, therefore, the most liable to this affection, although it is not unknown in the single nor in the unfruitful married woman.

When found in the virgin breast, it is often associated with some uterine disturbance or irregularity ; and in certain examples it may be clearly put down as the result of an injury. But the bulk of cases are found in women during the period of lactation, and most frequently during the first and second months.

The truth of these remarks will become more apparent after the perusal of the following analysis of the cases before me.

Analysis of 102 *Cases of Abscess of the Breast.*

79 instances occurred during lactation.
2   ,,   ,,   pregnancy.
21   ,,   in patients who were neither pregnant nor lactating.

Of the seventy-nine instances which were found in women who were suckling—

35 occurred during the first month........................			} 72 per cent.
22 ,, ,, second month			
3 ,, ,, third ,, ...			
3 ,, ,, fourth ,, ...			
None ,, ,, fifth ,, ...			} 12 per cent.
3 ,, ,, sixth ,, ...			
1 ,, ,, seventh ,, ...			
None ,, ,, eighth, ninth, tenth month			

And 1 during the eleventh, twelfth, thirteenth, fourteenth, and fifteenth month respectively ...... 6 per cent.
In 7 others the month was not stated.

It thus appears that nearly three fourths of the cases occurred during the first two months of lactation.

It is difficult to find a sufficient explanation of this fact. A fissured condition of the nipple may in certain instances suffice to give rise to the complaint, but the connection between the two is not so common as some men would lead us to believe, and as the majority of women who are the subjects of this

affection are cachectic and feeble, I am disposed to think that the true explanation of the cause is to be found in this fact, believing with Mr. Ballard that " abscess in the early months is due to the searching of the child after milk, before the gland is filled," in patients who have neither sufficient power to secrete, nor to resist the inflammatory process when once originated.

Seat of the Disease.

It has generally been stated that both breasts are equally liable to be affected with inflammation, but an analysis of the cases before me does not confirm this opinion, for of the 102 cases—

<div align="center">

55 involved the right breast
30   ,,   ,,   left   ,,
5   ,,   ,,   both   ,,
And in 12 the side was not stated.

</div>

In the notice of other cases which have passed under my care, the right breast has been decidedly the most frequently involved.

In twelve cases which took place in girls under sixteen years of age, eleven were in the right breast and one only in the left.

Rapidity of Progress.

The rapidity with which inflammation of the breast progresses in different cases varies considerably, depending, as it does, on the acuteness of the inflammation and the resistance offered by the constitutional power of the patient. In certain instances the disease runs its course very rapidly, and passes on to suppuration within a very few days; in others, again, this result may not occur for weeks or months; and there is hardly a limit to the period for which a chronic abscess may remain in an inactive and indolent condition. The severity of the symptoms will necessarily vary, therefore, in degree, and the activity of their treatment must be proportionately influenced.

Abscess in the Male Breast.

It is not a common occurrence to meet with inflammation or suppuration in the male breast; still it does occasionally come under our notice, although amongst my notes of the

cases admitted into the hospital I am unable to find one recorded ; from my private notes of other cases, however, I have two interesting examples.

CASE 1.—One was in a man, æt. 20, who came under my care in January, 1858, with suppuration of the right breast of two weeks' standing. He could give no history of having received any blow or injury. The abscess was opened, tonics were given, and a good recovery ensued.

CASE 2.—The second case was in a lighterman, æt. 34, who applied to me in June, 1862, with suppuration of both breasts, but in this case a distinct history was given of repeated injury from the striking of the oar. Both breasts freely discharged, and under the influence of tonics a recovery followed.

Treatment.—As already stated, the activity of the treatment of the affection we are now considering must be regulated by the acuteness or severity of the inflammatory process, and the nature of the constitutional and local symptoms to which it may give rise. As a broad truth, however, it may be confidently asserted that the inflammatory process is of a low type and of a destructive nature, and that, as the constitutional powers of the patient are generally feeble, nothing like lowering measures are to be adopted, but, on the contrary, soothing local applications and constitutional tonics, with sedatives, are absolutely demanded.

In cases of inflammation of the breast taking place during lactation I have never seen an instance in which any other principles of treatment than those I have just laid down could be entertained. The subjects of this affection have been always feeble, and want of power has been the prominent symptom. Under such conditions, therefore, soothing fomentations to the breast, either of warm water or of some medicated solution, as the decoction of poppies, are the local applications which give the most relief, although a light linseed poultice or some spongio-piline may be well employed.

Rest in the horizontal posture affords striking comfort to the patient, and, when it can be carried out, is of great prac-

tical advantage ; but if this desideratum cannot be secured, the whole breast must be well supported by a band or linen sling.

During this time tonics, in such a form as can be borne and may be demanded, should be freely given, quinine being probably the best. Stimulants, such as wine or beer, should be cautiously administered, few cases not requiring such an addition to their diet, and plenty of good nutritious food should be allowed.

A sedative at night is also very generally needed, for want of sleep from pain is a common accompaniment, the Dover's powder, in ten-grain doses, being the best form.

A mild purgative in the early stage of the disease may be called for, but everything like excessive purgation should be avoided, as the object of the surgeon is to supply power, and not to take it away—to soothe symptoms, and not to irritate.

On Opening the Mammary Abscess.

Upon the propriety of opening a mammary abscess there is amongst surgeons a great difference of opinion. Some believe it to be the best practice to let the breast alone, and to allow nature to complete the operation, whilst others advocate the making of an early opening. In neither of these opinions am I disposed to coincide, although I believe it to be a right practice to postpone puncturing the organ as long as possible, for any over-anxiety to evacuate the pus is not followed by a favorable result. Still, on the other hand, when the abscess is left to itself much unnecessary suffering is often endured, and a considerable sacrifice of skin often follows, entailing a longer convalescence and an uglier cicatrix. The practice I generally adopt is to leave the parts alone till I find pointing has taken place, and then to puncture, making my incision in a line radiating from the nipple of the patient.

By adopting this practice any unnecessary pain is also saved to the patient, for the appearance of pointing is left much to the observation of the surgeon, and it is not necessary to make frequent and careful physical examinations. Of course, some gentle manipulation is absolutely called for, to enable the surgeon to form an opinion, but the eye is the chief

guide, and not the finger. Much manipulation of the gland is both painful and injurious, but an absolute abandonment of all local surgical treatment can only be condemned.

Warm fomentations are in all stages of the disease very grateful to the patient, and may be freely used ; when early suppuration threatens, a light linseed poultice is probably the best application ; but when the abscess has discharged, the poultice may be laid aside, and wet lint alone be employed, for constant poulticing soddens the integument, and retards the process of convalescence.

On the Treatment of the Chronic Abscess.

The existence of a chronic abscess having been made out—a point, by-the-bye, which will be returned to when the subject of the diagnosis of a mammary tumour is discussed—it becomes an important question what treatment should be pursued.

When the abscess is small, and is causing but little, if any, annoyance, it may be left alone, and, under the influence of tonics and local pressure by means of strapping, the fluid may be absorbed, for such a result is occasionally brought about. In the majority of examples, however, some more active treatment is required, and in these the evacuation of the pus is the chief point. If the abscess be large and deeply seated—a common condition—the drawing off of its contents by means of a trocar and canula is the usual practice, and it is generally believed to be the best ; but it has this disadvantage, that the wound generally soon closes, and a second operation is then required. The same treatment may be again resorted to, with the same results, and this drawing off of the pus and subsequent closure of the wound may go on for many times. At last, however, the opening remains patent, and the abscess contracts, leaving in the majority of cases a sinus. Under these circumstances a bolder plan of treatment seems absolutely demanded, for time is an important element in the consideration of any plan of treatment, and the best method appears to be a free opening at the first operation, or, what is still better, the draining off of the pus by means of a perforated india-rubber tube, introduced through the canula after the first operation.

I have followed this plan on several occasions with marked benefit, and can with some confidence recommend the practice.

On the Treatment of Sinuses.

The treatment of sinuses in the breast, as elsewhere, is always a task of some difficulty, and in certain cases all plans will be found to fail; but the one principle of practice which seems to be the most valuable is the establishment of a dependent outlet, for when this has been secured the upper sinuses, as a rule, heal. To gain this end, the introduction of a drainage tube, in the way already mentioned, is a valuable practice, and certainly a simple one.

Should there be many sinuses, some pressure may be employed, care being taken that the openings are left uncovered, and that a free passage is left for the discharge.

Superficial sinuses may be slit up, if other means fail, and in very chronic cases some irritant, as iodine, may be injected, to excite a fresh action, but the great principle of practice in these cases appears to be the one to which I have already alluded, although others may be at times demanded when this fails.

I have put this plan of practice into operation on several occasions, and have every reason to be well satisfied with the result.

CHAPTER II.

ON THE DIAGNOSIS OF TUMOURS OF THE BREAST.

An Analysis of Cases.

THE object I have in view in the following pages is to elucidate the subject of diagnosis of tumours of the breast, and with this aim I shall proceed to point out the symptoms which characterise the simple and malignant tumours of that organ; and to dwell on such pathological points as may be required to make the practical consideration of the subject quite intelligible; to consider the value of each symptom, and the mode

of its production; and to distinguish the symptoms which may be described as being "special" from those that are "accidental."

By way of introduction, I shall first give a brief analysis of the cases before me, noting such points of interest as more particularly bear on the object I have in view.

For all practical purposes, tumours of the breast may be divided into the *inflammatory*, the *innocent*, and the *malignant*.

Amongst the inflammatory may be classed the cases of acute and chronic inflammation of the breast, whether terminating in suppuration or resolution, and also the cases of painful or irritable breasts which are found in the young or middle-aged.

It will, however, be foreign to my present purpose to dwell at any length upon the inflammatory conditions of the organ, for inflammations of the breast are not scientifically to be classed under the head of tumours, this term being properly confined to the presence of a new growth, possessing its own special vitality and power of increase. Nevertheless, inflammatory affections do approach the characters of tumours in certain points, and in the discussion of the diagnosis of tumours demand attention.

In the *acute inflammation* of the breast there is scarcely room for any doubt as to the true nature of the disease, for it is attended with all the symptoms which usually characterise inflammatory affections, and its usual termination by suppuration forbids the possibility of an error being entertained.

In *chronic inflammations* of the breast, however, this absolute certainty in diagnosis is not so easy, and in some cases a correct diagnosis would seem to be almost impossible. I have seen a chronic abscess in the breast removed for a cancer, and others have seen the same thing, and in the preparation jars of Guy's many glands the seat of a chronic inflammation have been discovered having been removed for diseases of a more serious nature.

Such mistakes as these, however, are not common, diagnostic errors gradually disappearing under an improved knowledge of pathology and of the value of special symptoms.

As the basis of my remarks, I propose to give an analysis of such cases as I possess.

Analysis of Cases of Adenocele, or Innocent Tumours of the Breast.

In analysing the fifty-four cases of which I possess an accurate record, I have been guided by the example of my colleague Mr. Birkett, who has laid before the profession, in a masterly paper published in the 'Guy's Hospital Reports' for 1855, a complete account of the tumours which he has denominated adenocele; and it will be seen that my analysis of cases, in their general results, will support the conclusions which he has there educed.

I may add that, of the fifty-four cases I possess, thirty-five were admitted into the hospital under the care of my colleagues, and nineteen have occurred in my own practice.

The first point to which I will draw attention is the age of the patient when the tumour was first observed, and, adopting the division of Mr. Birkett into three periods of sixteen years—" the *first,* from birth to sixteen, which may be termed the developmental period; the *second,* from sixteen to thirty-two, the period of developmental perfection of the gland; and the *third,* from thirty-two to forty-eight and upwards, the period of functional decline "—it will be seen from the following table that—

> Between birth and 16 years of age .... 3 cases appeared.
>   17 „ 32   „   30   „
>   33 „ 48   „   and upwards 21   „
>   Total .... 54 cases.

> 17 cases commenced between 15 and 20 years of age,
> 14   „   „   21 „ 30   „
> 11   „   „   31 „ 40   „
> 10   „   „   41 „ 50   „
> 2   „   „   51 „ 60   „
> And 27, or half the whole number, appeared before the patient was twenty-four years of age.

From this analysis it becomes tolerably clear that it is during the period of life at which the procreative organs are the *most active* that the adenoceles, as a rule, make their appearance,

and this conclusion is supported by the facts which the following table well displays.

Social Condition of Patient when the Tumour first appeared.

27 were single, or half the whole number.
19 ,,   married and prolific.
 7 ,,   ,,   ,,   sterile.
 1 the condition was not stated.
——
54

But it must be observed that, in the nineteen married and prolific women, the growth appeared in eleven examples during pregnancy, in two during suckling, and in six some years after childbearing, these facts demonstrating to a nicety that it is when the gland is most active that these " new growths " are most frequently developed.

Table showing the Seat of the Disease.

Right side .... 28 cases.
Left side .... 23 ,,
Double .... 3 ,,
——
54 ,,

The right breast is seen to be as frequently the seat of disease as the left, but in a small proportion of cases both organs are attacked.

Analysis of Cases of Carcinoma of the Breast.

I possess the records of 222 cases, 180 of which have been admitted into the hospital, while 42 are from my private notes. I shall now proceed to give the results of a careful analysis of the whole number.

Age of Patient when the Disease first appeared.

Under 20 years of age there was no instance.
From 21 to 30 there were 17 cases, or 7 per cent.
      31 to 40   ,,   68   ,,   30   ,,
      41 to 50   ,,   78   ,,   35   ,,
      51 to 60   ,,   42   ,,   19   ,,
      61 to 70   ,,   17   ,,   7   ,,
——
Total   .   . 222 cases.

Or, if we adopt the same divisions we have made for the adenoid tumours, it will be observed that—

<div style="margin-left:2em;">

Before   16 years of age no case.
Between 17 and 32 there were 28 cases, or 12 per cent.
     ,,   33 ,, 48   ,,   126   ,,   56 ,,
     ,,   49 ,, upwards ,,   68   ,,   30 ,,

      Total   ·   .   222 cases.

</div>

57 per cent., or more than half, of the cases of cancer in the breast appearing during the period of life which has been denominated that of functional decline of the mammary gland, that is, between the ages of thirty-three and forty-eight.

Social Condition of the Patient.

Influence of Marriage, &c.

<div style="margin-left:2em;">

169 cases occurred in the married, or 76 per cent.
 48   ,,   ,;   single ,, 21 ,,
  5   ,,   ,,   widow ,,   2 ,,

</div>

These proportions are very similar to those published by Mr. Paget and Mr. Sibley in the 'Transactions of the Medical and Chirurgical Society,' vols. xlv and xlii respectively.

Of the 169 married women, 123 had given birth to children, or 72 per cent.   In 46 cases the women were barren.

It would thus appear that the married women are more liable to cancer of the breast than the single, and the fruitful than the barren; the one whose mammary gland has been in the most active condition being more prone to cancer than the sister in whom no demand has ever been made upon the special functions of the gland.

Again, if we look at our cases more closely, an interesting comparison may be drawn between the single and the married, more particularly in relation to the period of life at which cancer is most liable to appear; the inference to be drawn from the comparison well bearing out the opinion that cancer is the most liable to attack the gland during the period of its functional decline; for it is fair to believe that in the barren or single woman the mammary gland loses its functional activity at an earlier period of life than it does in the married and fruitful woman, the special functions of the breast being preserved in such till a later date.

The comparison will be best seen by looking at the two following tables, which I have placed side by side.

Tables showing the different periods of life in the Single and the Married at which Cancer is the most liable to appear.

Years of Age.	SINGLE.			MARRIED.			General average.	
Between 21 and 30...	5 cases, or	10	per cent.	12 cases, or	6	per cent.	7	per cent.
,, 31 ,, 40...20	,,	41	,,	48	,, 27	,,	30	,,
,, 41 ,, 50...15	,,	31	,,	63	,, 36	,,	35	,,
,, 51 ,, 60... 5	,,	10	,,	37	,, 21	,,	19	,,
,, 61 ,, 70... 3	,,	6	,,	14	,, 8	,,	7	,,
Total cases . 48				Total cases 174				

The evidence of the preceding tables, as far as it goes, indicates that cancer more frequently makes its appearance in single women before the age of forty than in the married or fruitful, and this accords with what we might expect, the functional power of the mammary gland in the single woman declining at an earlier period of life than in the married.

If we take Mr. Birkett's three periods for comparison, the same result becomes manifest.

	SINGLE.			MARRIED.		
Between 17 and 32 years of age,	8 cases, or	16	per cent.	20 cases, or	11	per cent.
,, 33 ,, 48 ,,	31 ,,	64	,,	95 ,,	54	,,
,, 49 and upwards	9 ,,	17	,,	59 ,,	33	,,

Table showing the frequency with which it attacks either Breast.

Right side..................................... in 120 cases.
Left ,, ... 95 ,,
In both...................... .. .. 7 ,,

Total........................,..... 222 ,,

Hereditary Predisposition.

It is always difficult to obtain any accurate account from hospital patients as to their hereditary predisposition to cancerous disease, and it will be seen that it is only in a very small number of the cases from which this analysis has been made that any such history could be obtained; although it must be added that it was a point which I always took considerable

trouble to bring out when taking notes of the cases as they passed under observation.

Out of the 222 cases some distinct history of the presence of a cancer in some member of the family was obtained in twenty-two instances, or in about 10 per cent. of the whole number; eighteen of the twenty-two cases having had one cancerous relation, while each of the remainder had two relatives affected.

Table showing the time the Disease had existed before the Patient came under observation.

In 11	cases the disease had existed			3	months	
9	„	„	„	from 3 to 6	months	⎫ 57 cases, 1 year.
37	„	„	„	6 12	„	⎭
26	„	„	„	12 18	„	⎫ 41 cases between
15	„	„	„	18 24	„	⎭ 1 and 2 years.
12	„	„	„	2 3	years.	
10	„	„	„	3 4	„	
6	„	„	„	4 5	„	
5	„	„	„	6 7	„	
2	„	„	„	8	„	
1	„	„	„	9	„	

133 cases.

In all of these the disease was excised, and nine died, or 6·7 per cent. Eighty-nine cases were left untouched, eight of which died, and the remainder disappeared from observation, relieved in various degrees.

Respecting the recurrence of the disease after operation, it would have been desirable to have added a few words, but the difficulties attending such an investigation, and the unsatisfactory information which my notes afford, forbid my putting forward any conclusion upon the subject.

The same observation applies to the influence of age upon the operation, and the influence of the operation on the duration of life, for it is almost an impossibility to follow up the cases of cancer when they leave the hospital, and thus to arrive at any safe conclusion.

It is to be regretted that this should have been the case, but such it is, and I have therefore thought it better not to give any, rather than give deceptive, statistics.

With this brief analysis, therefore, of the simple and

malignant tumours of the breast, I propose to pass on to the more special subject of the diagnosis of tumours.

CHAPTER III.

ON THE CLINICAL EXAMINATION AND DIAGNOSIS OF A TUMOUR OF THE BREAST.

THE first point a surgeon has to determine when consulted by a patient who has "something the matter" with her breast, shapes itself in some form or another into the question as to the existence or non-existence of a tumour. That is, is there a new growth developed behind, within, or in connection with, the mammary gland? or is the disease from which the patient is suffering situated in the tissue of the glandular structure itself? This first and most important question is one which must needs be solved before a further step can with any safety be taken towards the formation of a correct diagnosis of the case, and it is quite impossible to magnify its importance. To do this, however, considerable care is needed, and some manipulative skill is called into requisition; for a careless examination will surely end in an uncertain diagnosis, and with this a failure in treatment must necessarily follow. In examining a breast, therefore, with diagnostic intentions, the surgeon should take the whole gland in his hand; he should manipulate it gently and in every part with his fingers and thumb; and by these means he will, if an isolated tumour is to be found, in all probability detect its presence; if, however, he be uncertain upon this point, he should make the patient lie down, and if a new growth then really exists he will at once discover it. "If a patient be sitting or standing, and the breast is grasped by the finger and thumb, when induration of the gland itself exists, a sensation is felt as if a tumour were present. If, now, the palmar surface of the fingers be pressed flatly against the chest in the same part, nothing remarkable is distinguishable. If a tumour or new

growth exists, however, it is immediately perceptible. But if any doubt arise in the matter, the patient should recline when under examination ; and then, if there be a tumour, it is immediately manifest to the touch, and often to the eye."[1]

Having, then, detected the presence of a tumour, that is, an independent growth, developed in the neighbourhood of the breast-gland, and probably in connection with it, the question arises as to its nature. Is it a simple tumour, or is it a malignant one ?

If the tumour be moveable and hard—if it be quite free, or if it has but a very uncertain connection with the gland structure—there is a strong probability that the tumour is of a simple nature ; and, if it has existed for several months, this probability becomes stronger, for it is an early characteristic of the *cancerous* tumour, even when primarily developed as a tuber, or as an independent structure, to associate itself and to become connected with the neighbouring tissues ; and if this has not taken place, the absence of these conditions enhances the probability of the simple nature of the growth under examination. If the patient be also young and healthy, and if no other abnormal conditions, either of the breast or neighbouring structures, are to be detected, the probability becomes a certainty, and the presence of an "adenocele" may be determined on.

For these *adenoceles,* as a rule, appear in the young and unmarried ; in the comparatively healthy and robust. They appear during that period of life when the procreative organs, and amongst them the mammary glands, are in a state of " developmental perfection ;" and when attacking the married woman, they most frequently are developed during pregnancy or suckling. They are never associated with any other symptoms than such as can be produced mechanically by their presence, they never involve the integument except by distension, and the skin is never infiltrated by any new material. They are never accompanied by any secondary enlargement of the absorbent glands, nor associated with any secondary deposits ; they never cause any cachexia nor undermine the health of their

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[1] Birkett, 'Guy's Reports,' 1855, p. 135.

possessor, they affect the patient solely through local in-
fluences, and demand treatment chiefly from local con-
siderations.

As local affections, they are, however, at times exceedingly
distressing.   As long as they remain small and quiescent, they
are of small importance; and being moveable, and unaccom-
panied by any other symptom, they are readily diagnosed; but
when years have been allowed to pass, and their growth has
increased, when from their greater size they become burden-
some, and press on neighbouring structures, they are neither
of small importance nor are they readily to be distinguished.
But yet, if careful observations are taken, an error in diagnosis
should not be made.

For although the breast itself may be much pressed on, or even
expanded over the tumour, it will still exist, and on careful exa-
mination its presence, as a rule, will be made out.   The nipple,
although flattened from the extreme glandular expansion, can
still be seen, but it is hardly ever retracted.[1]   The integuments
may be stretched to an extreme point, yet they will still be move-
able and sound, although some inflammation from over-dis-
tension may have made its appearance, and large veins are
always to be observed meandering in the healthy tissue.
The tumour, if solid, may appear lobulated, and, if containing
cysts, fluctuation may be detected.   Still, the disease is essen-
tially a local one, and affects the patient through purely local
considerations.

*The Diagnosis of a Tumour which is evidently caused by
some partial or general Enlargement or Infiltration of the
Mammary Gland.*

Let us suppose, however, that the surgeon has a case of
disease of the breast before him in which the structure of the
gland is itself involved; that there is no independent moveable
tumour, such as we have been considering; but that it is
evident on manipulation that the malady, whatever it may be,
is intimately connected with the gland structure.

What is the case?   Have we an inflammatory affection only

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[1] 1 have seen but one exception to this rule.

of the organ, or have we some simple hypertrophy or innocent enlargement? Is it a simple disease, or is it a malignant one?

If the manipular indications of the mammary gland are those only of enlargement, is such a condition due to pregnancy, or is it the product of a simple hypertrophy, confining the meaning of that term to an excess of growth?

If the increase be due to hypertrophy, which, by-the-bye, is an exceedingly rare condition, this has been to a certainty of a chronic nature, its increase has been slow and its growth painless; it is simply characterised by an increase in size, and beyond that can hardly be regarded as a disease; there is certainly no increase in action beyond that which growth demands.

If the enlargement be due to pregnancy, there can be little difficulty in the diagnosis, for it is attended with an activity of the local circulation, a general fulness of the gland, an enlargement of its veins, and a darkening of the areola, which will not fail to excite suspicions. Besides this, *both glands* will be similarly affected, a coincidence which is rarely seen in any morbid condition. The very suspicion of pregnancy, however, will be enough to call attention to other points, by which a solution of the difficulty will be obtained.

Is the enlargement to be explained by any inflammatory condition? I do not mean an acute inflammatory condition, for such an affection has features which are too characteristic to require any further allusion; but is this infiltration of the gland, which is present, to be explained by some chronic inflammatory change, such as is so frequently found in the female breast? In certain patients—that is, in the middle-aged—when cancerous affections are to be looked for, the presence of an indurated mammary gland, whether it be partial or complete, must always be regarded with suspicion, and in certain cases I believe it to be an impossibility to form any certain opinion as to its true nature. If the induration of the gland be the only symptom, and this induration be associated with a sharp pain, or even a dull one, either a simple chronic inflammation of the gland may be indicated, or the early condition of a cancer; under such circumstances it is as well to wait before giving any

positive opinion; if, however, much time has already passed, say many months, and no other symptoms have made their appearance, there is some good ground for the hope that the enlargement may be due to inflammation, for infiltrating cancers are not generally inactive—as a rule, are not stationary—and soon give rise to other symptoms, such as some enlargement of the absorbent glands, although this may be slight, some slight dimpling or drawing in of the skin, an important sign; or some more marked symptom, such as infiltration of the integument. A retracted nipple is also a frequent accompaniment of a cancer, but this is only an accidental symptom, such as may be caused by several conditions, and is not by any means characteristic.

If, however, any one or all of these symptoms show themselves soon after the first appearance of the lobular enlargement of the mammary gland, an opinion as to the cancerous nature of the growth may be confidently expressed. If, on the other hand, none of these symptoms make their appearance, and the induration or infiltration of the lobes of the gland remain stationary, or show some tendency towards improvement, the probability of the simple character of the disease gains ground.

Should this induration of the mammary gland appear, however, in the *young subject*, there will be no reason to suspect a cancer, and it should rather be regarded as the result of some slight inflammatory effusion. There will, as a rule, be some increase of pain after examination, but there will be an absence of any other local symptom. There will probably be some irregularity of the catamenia and some signs of general excitability of the patient. But as a local affection, there will be only the one symptom of induration of one or more lobules of the mammary gland, which, *in the absence of all others*, may with safety be regarded as inflammatory.

The same argument holds good when the disease appears at a later period of life, although our suspicions of a cancer should rightly be excited; still, the positive diagnosis must be postponed till, by the lapse of time, some other symptoms, such as those already mentioned, make their appearance, to clear up all doubt, or by their absence prove the innocent

nature of the affection. For the *cancerous tumour* of the breast
most frequently appears in middle life, that is, when the pro-
creative organs are verging towards their natural period of
functional decline, such a period taking place at an earlier
date in the single than in the fruitful woman. It attacks the
married woman more frequently than the unmarried, and, when
infiltrating or involving the breast-gland, is seldom stationary.
Commencing, as it may, as a simple induration, the tumour
will increase ; it will gradually encroach on neighbouring
tissues, and form attachments, becoming, as a consequence,
more fixed ; it will, sooner or later, involve the integument,
at first simply causing a slight dimpling, and then a puckering ;
the skin will soon become less moveable, then fixed, and in a
later stage will, like other tissues, be infiltrated with the same
cancerous materials.   The glands of the absorbent system
connected with the breast will, in a cancer, soon show
symptoms of enlargement, and this will in a later stage
become so great as to press upon the nerves and veins of the
arm, causing œdema to a greater or less extent.   Ulceration
of the integument, preceded by a softening down or breaking
up of the tumour itself, will soon appear, and with this the
characteristic infiltration of the margin of the wound, with
its indurated, everted edges.   A general cachexia, from the
pain and wasting discharges, will soon show itself, and
more or less distinct evidences of the complication of other
organs, and under such circumstances the end is not far
off.   The disease has run its course, and with it the powers of
its victim have been undermined, victory remaining with the
strongest.

On the Development of Cysts in Tumours of the Breast.

In practice, many examples of tumours of the breast come
under the observation of the surgeon, the diagnosis of which
is much obscured by the presence of cysts, or rather what
Mr. Birkett describes as capsules, containing fluid of divers
characters ; for the development of a cyst in the majority
of tumours is a mere accident ; it is not a new develop-
ment, such as the more solid portion of the tumour, nor is
it in any way to be compared with the simple cystic for-

mations which are found in the neck or other portions of the body; it is to be looked upon as a collection of fluid, probably serum, more or less blood-stained, and it is by its gradual accumulation that the more solid growths are separated, and an apparent cyst is formed. But this cyst is only spurious, for it has no special structure, its artificial walls being made up of condensed cellular tissue.

The existence, therefore, of false cysts, such as I have briefly sketched, in any of the breast tumours, whether adenoid or malignant, is to be regarded as a mere accident, for accumulations of serum are found to take place in any new growth, and thus may give rise to the cystic tumour.

The presence, therefore, of cysts in a mammary tumour has no weight in determining either the innocency or the malignant nature of the growth under examination; they are the product of a mechanical cause, and may consequently occur in either form; they are not special growths, nor are they of any intrinsic importance. The diagnosis of the tumour containing such cysts rests on other points, and more particularly on such as have been already indicated. As a rule, however, these so-called cysts are found in the less firm and solid forms of tumour, in those that contain less cellular or connective tissue, and in the more rapid developments rather than in the slow.

When found in the *adenocele or innocent growth* the tumour will be more or less solid, but in the parts in which the false cysts or capsules exist the growth will be more lobulated and loosely connected; loose pedunculated growths will, in some instances, be seen lying within these capsules, their floating extremities being bathed with the so-called cyst contents; the different forms assumed by these tumours depending upon the amount of connective tissue which binds together the several lobes and lobules, and the dimensions of the interspaces which go to form the false cysts.

When these cysts are present in the *malignant tumour* they are produced in precisely the same way as in the innocent; but as the formation of the former differs from that of the latter, the cystic contents will vary also, the false cysts in the one instance containing the more or less solid characteristic lobules of the adenoid growth, whilst in the other case

they are filled with the less developed and more irregular, but
equally characteristic, material which goes to build up the can-
cerous tumour.

On the Diagnosis of the " True Cystic Adenocele " of the Breast.

The remarks I have just made respecting the importance
of cysts in the innocent and malignant tumours of the breast
are not applicable to every cases; for to this rule, as to others,
there is an exception, and in the present subject the exception
is to be found in that form of cystic disease of the mammary
gland which differs from the other forms of adenoid or new
growth—developed independently of, although allied to, the
breast-gland itself, such as those already dwelt upon—for it is
essentially a cystic disease of the gland itself, and is more par-
ticularly connected with its secreting ducts.　It is, however, of
an innocent nature, and pathologically is allied to the genuine
adenocele; it is the tumour originally described by Sir B.
Brodie as " arising by a dilatation of portions of some of the
lactiferous tubes," or by Mr. Birkett as " Cystoid formations,
distinctly referable to the dilatation of a duct, or to a con-
nection with one, and containing growths which appear to
spring from their walls."　These growths are strictly analo-
gous in their structure to the pedunculated or floating bodies
which have been observed in the other forms of adenocele; con-
taining, like them, a structure allied to the breast-tissue, and
being composed of more or less distinct cæcal terminations of
newly developed ducts, with variable quantities of true con-
nective tissue.

How, then, is such a tumour to be made out? and what are
the special symptoms which characterise it from the other
forms of mammary tumour?

First of all, it is to be looked upon as an innocent tumour,
and, consequently, it will be found to affect the patient pre-
cisely in the same way as all other adenoid tumours, in a
purely local manner.　It is to be regarded as a local disease,
which at no period of its growth and in no way affects the
patient otherwise than through local causes; it is never
associated with secondary glandular enlargements or with

secondary deposits in other tissue, as in the cancerous tumour, and we must therefore look to local symptoms to guide us in the formation of a correct diagnosis.

It is to be remembered that it is a *genuine cystic disease.* The tumour is always made up of cysts, possessing solid contents in different degrees; but the existence of cysts is uniform and characteristic; *it is also a disease of the gland itself.* Unlike the other forms of adenocele, whether cystic or solid, it is a new growth, developed and growing independently of the mammary gland, although in some instances having a slight connection with it; but it is a true cystic adenoid disease of the mammary gland, dependent upon the dilatation of its ducts; and has, therefore, in the majority, if not in all cases, some communication through the nipple with the external surface. As a result, this condition gives rise to a symptom which, when present, must always materially tend to confirm the impression which may have been formed by the careful observation of the case, and by the presence of those conditions to which attention has just been drawn, and that is, the power the surgeon has to evacuate some of the contents of the cyst or obstructed ducts through the nipple of the organ by gradual pressure.

A cystic tumour of the breast-gland, in a healthy woman, unattended by any other than local symptoms, and accompanied with the discharge of a clear or coloured viscid secretion from the nipple, which can be induced or materially increased by pressure, may with considerable confidence be set down as the form of disease we are now considering, and may with justice be described as the *true cystic adenocele* of the mammary gland, in contradistinction to the false adenoceles or other tumours, which have but little, if any, connection with the true gland-tissue, but which are new growths partaking of the nature of the breast-gland, according to the pathological law, which appears universal, that all new growths partake of the nature and peculiarities of the structure in which they are developed.

On the Open, Ulcerating, and Discharging Tumour of the Breast.

There is a period in the growth of any tumour situated in the mammary gland, or in its neighbourhood, when the integuments become so involved as to ulcerate or give way, and when a discharging surface or cavity exists which presents an aspect differing according to the innocency or malignancy of the growth with which it is connected. In the cancerous tumour it is almost needless to add that the open surface or discharging orifice will be distinctly cancerous; the integument itself or the margins of the wound will be found infiltrated with the cancerous material, presenting the thickened, indurated, and everted margin so characteristic of the cancerous ulcer, and which, when once seen and appreciated, can hardly be mistaken. Not so, however, with the innocent tumours, which are also liable to be connected at some period of their growth with an open wound and discharging cavity, for in these cases a very different condition presents itself to our observation; and to understand this difference it is essential to recall one or two points of difference which have already been mentioned in the nature of the innocent and malignant tumours.

It has been stated that it is the peculiar nature of the innocent tumour to affect the part in which it is developed purely mechanically; it may separate or displace tissues, but it never involves them in any other way.

On the other hand, it has been stated that it is the peculiar nature of all cancerous or malignant tumours to infiltrate and involve every tissue with which it comes in contact.

Applying, therefore, these two opposite features of the innocent and malignant tumours to those cases of both diseases in which the integument is materially involved, we shall readily understand how two very different local appearances will be produced; for in the cancerous, as just explained, the wound or surface will be characterised by all the peculiarities of the cancerous ulcer, whilst in the innocent tumour the integument will have given way purely from over-distension, and, as a consequence, the margin of the wound or discharging cavity will

look healthy, free from all appearances of infiltration, and rather as if cut or punched out mechanically than ulcerated.

This great difference between the two affections is most important and is very palpable, and often enables the surgeon to form a correct diagnosis in a case where otherwise a difficulty might be experienced.

In the cystic adenoceles this healthiness of the margin of the wound is very marked, for it is not uncommon to find a sprouting and discharging intra-cystic growth protruding from the wound through the ruptured integument, and presenting a very doubtful and sometimes cancerous aspect; but if found projecting through an orifice of the integument which is un-infiltrated and apparently healthy, such as we have already described, the innocent nature of the tumour may with some confidence be declared.

On the Value of the Retracted Nipple as a Symptom in Tumours of the Breast.

There can be but little doubt that the importance of this symptom of the retracted nipple has been considerably over-rated, and that as a positive indication of cancerous disease it has been over-estimated. It may coexist with a cancer in the breast, as it may with some simple or innocent affection; but, on the other hand, a cancer of the organ may be present unconnected with any such morbid condition.

For a retracted nipple may be described as an accidental symptom in the development of a tumour; it is the product of mechanical causes, and its presence is determined by the manner in which the gland is involved in the disease rather than in the nature of the affection itself. Should any tumour, simple or malignant—should any abscess, chronic or acute—attack the centre of the mammary gland, a retracted nipple, in all probability, will be produced; for as the disease so placed will necessarily cause material separation of the gland-ducts, their extremities—terminating in the nipple—must be drawn upon, and, as a consequence, a retracted nipple will be the result.

In the early stage of an infiltrating cancer of the organ this symptom is one of frequent occurrence, the nipple being

always drawn towards the side of the gland which may be involved ; at a later stage, however, of the affection, when the infiltration is more complete, the nipple may again project. In a central chronic abscess of the breast the retracted nipple is equally common, and in the true cystic adenocele it may be also present.   In the ordinary adenocele, whether cystic or otherwise, it is rarely present, for very plain reasons, as these are not diseases of the breast-gland itself, but only situated in its neighbourhood ; in rare cases, however, such an association may exist ; in one case only have I ever observed it, and in that some blow or injury had preceded the development of the adenoid tumour, and it is open to a doubt whether the retracted nipple might not have been brought on by some chronic inflammatory condition, such a cause being well able to produce it.

On the Value of a Discharge from the Nipple for Diagnostic Purposes.

It is very questionable whether this symptom has really any material value for diagnostic purposes ; and when the discharge is slight or of a bloody nature, it certainly does not indicate any special affection.   It is well known that in *cancerous* affections a discharge from the nipple is not infrequent, the fluid having the appearance of blood-coloured serum, but it is never profuse, there being rarely more than a few drops.

In the *ordinary adenoceles* this symptom is seldom present.

In the *true cystic adenoceles* this symptom appears to be of considerable value, for in all the cases which have passed under my observation, and in the majority of the recorded examples, this discharge from the nipple was a prominent symptom, the fluid being generally of a mucoid nature, and more or less blood-stained ; and although at times it occurred spontaneously, and with relief to the patient, at others it could readily be induced by some slight pressure upon the parts.

It exists, therefore, as a symptom in the true disease of the breast structure, whether cancerous or adenoid ; it is but slight and uncertain in the former, and more general and copious, in the latter, and as a means of diagnosis becomes of some value.

On the Importance of Enlargement of the Absorbent Glands as a Diagnostic Symptom.

When these are present with a tumour of the breast, they bear important testimony to the malignant nature of the disease; for in all the simple adenoceles no such complications exist, although in the inflammatory affections of the organ they may be produced.

Still, in some cases of cancer of the breast many months may pass away without the appearance of these enlarged glands, and in one case of which I have the record a year expired without giving rise to such a symptom. Nevertheless, when they are present they are of positive value, and point towards the malignant rather than the innocent nature of the disease.

On the Value of the Tubercular and General Infiltration of the Integument over the Breast.

If there be one symptom which affords more positive evidence than another of the cancerous nature of the tumour in the breast, it is the one we are now considering, for no such symptom is ever present in any inflammatory or simple disease of the mammary gland. It is a genuine tubercular or general infiltration of the integument with the cancerous product, and, as such, is of special value. It may be slight, from the mere shot or pea-like affection of the skin, to its more general infiltration; but in all stages it is equally characteristic, and speaks in positive language of the cancerous nature of the mammary growth, one tubercle telling as plain a tale as many.

On the Excision of the Breast.

There is little or no danger attending the excision of the breast, beyond that which accompanies any or even the smallest operation.

It is true that patients occasionally sink after having passed through the operation, from pyæmia, erysipelas, or other causes,

contingencies which attend any practice, but from the excision itself there is little danger to life. Of the 133 cases of cancer which I have noted in which excision was carried out, nine cases died, or about 6·7 per cent., death taking place in each from the following cause :

One from pyæmia, on the thirty-fifth day; one from erysipelas, contracted several months after the operation, when the wound had healed ; two from acute bronchitis, three weeks and a month respectively after the excision ; one from profuse diarrhœa, on the eighth day, probably pyæmic; one from hæmoptysis, in the third week ; two from exhaustion after a return of the growth, in three and six months ; and one from actual sinking after the operation, on the third day. The three cases which died from pyæmia and from diarrhœa, which was also probably pyæmic, and the one which sank on the third day, may, perhaps, with justice be directly assigned to the operation, but the fatal termination in the remaining six examples had no reference whatever to the excision.

In the operations for the innocent tumour of the breast there was no fatal instance.

In operating for cancer it is unquestionably the wisest course to excise the whole gland, and it is as well not to be over-anxious about preserving too much integument, for if any doubt exists as to its perfect healthiness, the suspected portion had better be excised.

It is always important, when dissecting out the tumour, to keep clear of all diseased tissues, and in fatty subjects to leave a fair covering between the incision and the tumour itself, for there is good reason to believe that an early return of the affection is too often to be explained by want of attention to the practice to which I have just alluded.

In the operation for " *adenocele,*" it is quite exceptional for the removal of the breast to be necessary, and in the majority of instances such a practice would be clearly unjustifiable. As a rule, the tumour is readily removed on making a clean section through its cyst-wall, and the breast itself is rarely injured, even by the operation. In exceptional examples, however, of this affection, it is absolutely necessary that the breast-gland should be excised, that is, where a large tumour is closely connected with it ; and in the genuine or true cystic

adenocele of the mammary gland—in such examples as I have already quoted, and in those alone. In the removal of a small tumour not involving the breast the best practice is to make the incision in a line radiating from the nipple, and to manipulate the parts as little as possible; the surest plan being to cut well into the tumour, having previously raised and made it prominent by grasping it with the thumb and finger of the opposite hand quite at its base.

In cases of complete excision the best line of incision appears to be that which corresponds with the course of the fibres of the pectoral muscle.

After both operations steady and moderate pressure, by the application of a firm pad to either margin of the wound, possesses many advantages, and a more rapid union appears to follow such a practice than any other.

CASE 1.—*Cystic disease of the breast of fifty years' growth in an old woman aged seventy-three.* — E. C—, a healthy woman, æt. 73, was brought to me on October 5th, 1862, with an enormous tumour, the size of a soup plate, in her left breast. She was a married woman, and had one child, fifty years previously, and it was during her pregnancy that she first observed a small lump in her left breast. It was then, she stated, quite moveable, but she could not say whether it was connected or not with the gland itself. It had increased so gradually, and was so free from pain that she told no one of it till a very few months before her application to me, and then did so only on account of the assistance she required to dress it, as the discharge was profuse. When I saw her the whole of the left side of the thorax was covered with a morbid growth; it was in the position of the mammary gland, the nipple of which remained visible and apparently healthy. The tumour was moveable upon the chest, and presented an uneven bossy surface, with healthy, although thinned, integument stretching over it. At one part, however, there was a fissure, with a thin but healthy margin, through which sprouted a large fungating growth; from this there was a free and offensive serous discharge, and through the fissure in the integument a similar fluid escaped in great quantity.

The absorbent glands were quite natural, and the general health of the patient was very good.

An operation was suggested, as the tumour could have been readily excised, and there was nothing in the general condition of the patient to forbid its performance, but consent was not obtained, and no further history can be recorded.

Remarks.—There was enough, however, to enable us to form a correct opinion as to the nature of the case, for it was clearly impossible for any other than a simple tumour to have existed for fifty years.

It had appeared during pregnancy and during young life, it affected the patient solely through local symptoms, and gave rise to no single appearance indicating any cancerous affection.

The fissured condition of the integument and the healthy character of the orifice were also strong points in proof of the simple character of the new growth, this fissure having evidently been caused by the expansion and rupture of a large cyst, while the sprouting fungus was clearly due to the increase of the intra-cystic growth.

It was, on the whole, a marvellous specimen of the cystic adenocele.

CASE 2.—*True cystic adenocele, involving the whole mammary gland.*—Mary D——, æt. 49, a barren married woman, was admitted into Guy's Hospital, under my care, in September, 1860, with a tumour at the upper part of her right breast, of two years' growth.

On her admission the tumour was about the size of an orange, quite moveable, and evidently formed part and parcel of the mammary gland ; it was to a slight degree lobulated, and to the touch gave a peculiar knotted sensation, but was unconnected with the integument or parts beneath.   The nipple was natural, but elevation of it caused marked traction upon the enlarged gland, clearly indicating a connection between the two.

There was no other symptom present, and no affection of the absorbent glands. Excision was performed, and a good recovery followed.   Upon examination the tumour presented a beautiful example of the true cystic adenocele ; the whole gland through-

out was, as it were, filled with cysts, none being much larger than a pea, and in some, intra-cystic growths existed, which had all the microscopical appearances of the true adenocele. Bristles could also be passed from many of the cysts through the ducts into the nipple.

Unfortunately, the specimen has been subsequently lost.

In this instance of the true cystic adenocele it was interesting to observe the universal character of the cystic disease; no portion of the gland being free from the affection, although in no case were the cysts large.

The age of the patient was sufficient to excite a suspicion of the cancerous nature of the growth; but its manipulative indications were not such as are present usually in these cases, while the perfectly healthy condition of the neighbouring parts and absorbent glands negatived the idea of its malignancy.

Case 3.—*True cystic adenocele of the breast, from obstructed ducts.*—Caroline G—, a widow, æt. 43, residing at Hackney, was admitted into Guy's Hospital, under my care, on January 12th, 1862. She was a healthy looking woman, and had enjoyed good health; she had given birth to two children, and suckled both, the last having been born twenty years ago.

Her attention was first drawn to her right breast by the discharge of a viscid fluid from the right nipple, eight years previously, but at this time there was neither pain nor any apparent enlargement of the gland.

Two years subsequently she observed an enlargement of the breast about its centre, and shortly afterwards several other smaller tumours appeared in its outer side. At this period also pain first made its appearance; it was of a shooting nature, but was not constant, its severity appearing to depend much upon the presence or absence of the discharge from the nipple, increasing with the diminution of the discharge and diminishing with its increase. For six years the tumours steadily increased in size, till they formed one large mass, the size of a cocoa-nut; the nipple gradually became flattened, and at last retracted, the pain being of the same nature all through.

When the patient applied to me, a large tumour was very

evident, situated in the right breast; it appeared to involve the entire gland, and to be formed by it; it was nodular in shape, from the projection of cysts, and on firm pressure a bloody fluid could be pressed out of the retracted nipple. The tumour was moveable, and unconnected with the parts beneath; the integuments over it were much thinned, and adherent to it from recent inflammatory changes; the axillary glands were quite free from all symptoms of disease.

The distension of one of the cysts being very great, and threatening a rupture of the integuments, I was induced to tap it, when about an ounce of serum was drawn off, with much relief to the patient. On January 14th, however, as operative treatment was clearly needful, I excised the tumour, and rapid convalescence followed.

Examination of the tumour.—A section of the growth at once confirmed the accuracy of the diagnosis which had been made. The disease was evidently situated in the tissue of the gland itself, and was not a new formation distinct from the gland, as is seen in the more common form of cystic adenoid tumours developed in the neighbourhood of the mammary gland. It was apparently formed by a cystic dilatation of the gland-ducts, new intra-cystic growths, more or less pedunculated and branching, springing up within the cyst-walls. The structure of these intra-cystic growths was such as is generally found in all simple tumours of this nature, and showed under the microscope the cæcal terminations of the ducts and the elements of the fibro-plastic tumour; the former appearances, however, predominated. It was a genuine and admirable example of that form of breast tumour which was first described by Sir B. Brodie, as depending upon an obstruction to the lactiferous gland-ducts.

Remarks.—The particulars of this case form a complete clinical exposition of the ordinary history and most prominent symptoms by which the true cystic adenocele is usually characterised. It is true that the new growth appeared at a later period of life than the adenoceles generally, but I believe it to be the case that this variety of the affection is more common in the middle aged than in the very young. The growth of

the tumour, or rather tumours, all of which were in the gland itself, was slow and painless, and the early appearance of the discharge from the nipple of the viscid fluid was very significant. The appearance of pain at a subsequent date, associated with the retention of the mucilaginous secretion, was a point of great interest, together with the diminution of pain when the discharge recurred, these facts clearly proving that the disease was cystic, and that the cysts had a very direct communication with the ducts, through which they could be partially emptied.

The retraction of the nipple during the later months of the tumour's growth demands a notice, as it illustrates the method by which the symptom is produced—the gradual expansion of the central cyst, and consequent traction upon the extremities of the ducts causing their retraction.

On the whole, the points for diagnosis were tolerably clear. Although the age at which the disease had appeared in the woman, and the fact that the disease was situated in the gland itself, were enough to excite some slight suspicions of its cancerous nature, nevertheless, on the other hand, overwhelming evidence existed as to the probability of its simple nature, the following points being the most important :

1. The painless nature and gradual growth of the tumour.

2. The simultaneous presence of several tumours in the same gland.

3. The perfect mobility of the growth to the last.

4. The healthy character of the integument over it.

5. The total absence of all indications of induration of the absorbent glands.

6. The good health of the patient throughout.

7. The copiousness of the mucilaginous discharge from the nipple, and the freedom with which the cysts could be emptied.

CASE 4.—*False cystic adenocele, developed independently of the breast, with fibro-plastic elements.*—Sarah H——, a married woman, æt. 41, presented herself before me at Guy's Hospital, in March, 1862. She was pale and somewhat delicate in appearance, having suffered severely for some months from irregularity of the catamenia. She married at eighteen years

of age, and twenty-two years ago had her last and only child, which was stillborn.

Shortly after this event she observed a small tumour in her right breast; it was hard, moveable, and free from pain except when touched. She thought little about it, and did not seek advice till two years ago, when I first saw her; at which time a large solid tumour, the size of a fist, was readily detected, situated behind and quite distinct from the gland-tissue. It was moveable and very firm. An occasional dart of pain at times passed through it, but in other respects the woman was quite well, and sought advice simply on account of the mechanical inconvenience which the tumour caused.

There was then little doubt as to its nature, the history of the case and local appearances of the growth, all indicating that it was a simple mammary glandular tumour. I advised excision; but, from various domestic reasons, she was unable to come into Guy's, and disappeared from observation for upwards of two years, and came to me again in March last (1864).

The tumour had in this interval grown immensely; it was at least double its former size, and had so expanded the gland-tissue upon its surface that it was quite impossible to separate the one from the other. The nipple was quite flattened, but no discharge from it had ever been observed.

The surface of the tumour was irregular and nodular, apparently from the growth of cysts; but the axillary glands were quite healthy.

On March 11th I excised the growth, removing with it the breast-gland and some of the expanded integument, the operation being followed by a rapid recovery. On examining the growth its true nature was revealed; it had evidently been developed behind the gland in its own capsule, the breast itself being expanded over its surface, from which it could readily be separated.

It was composed of a large mass of new growth, which microscopically had all the elements of the fibro-plastic tumour, and this in the centre had softened down, forming a cavity containing a diffluent mass of broken-down structure. This fibro-plastic growth was nodular externally, and had thus given rise to the idea that many cysts had existed upon its surface.

On one of its sides a large cyst, with many smaller ones, was very evident, containing arborescent growths of the true adenocele structure, showing under the microscope beautiful examples of the cæcal terminations of the ducts as new formations.

On the whole, the specimen was a good instance of that variety of adenocele tumour which is developed independently of the gland-tissue, which is composed of true adenocele structure and fibro-plastic elements, showing at the same time how these two forms of tumour run into one another, and how, as in this case, they may even coexist in the same specimen.

Remarks.—This case, in its history and symptoms, forms a good contrast in many points to the one we previously quoted; for if the former was a good illustration of the *true* cystic adenocele in every particular, the latter is equally good as illustrative of the *false* cystic adenocele in all its details.

In the present case the tumour had appeared in early life, about the age of nineteen, and about the period of pregnancy; it was then hard, moveable and free from pain except when manipulated, and caused so little inconvenience for twenty years that she never sought advice, and afterwards only applied on account of the mechanical inconvenience of so large a growth.

When first subject to observation the tumour was very large, but could be readily separated from the breast-gland which was covering it in; it was then quite moveable, and unaccompanied with any other symptom. The integument over it was quite healthy, and the absorbent glands sound.

The general health of the patient was also unaffected, as may be guessed from the fact that even at this time she delayed any operative interference, not from the dread of the operation, but simply on account of the inconvenience her absence from home would cause, although it must be added she was in a very comfortable condition in life. In two years, the time which elapsed before she again sought advice, the tumour had considerably increased, and it was then quite impossible to distinguish between it and the true gland; cysts also had made their appearance, but in all other respects the symptoms

were the same, the integument, of course, being more stretched, but otherwise quite healthy. The nipple was flattened from mechanical causes, and there was no discharge from it.

The absorbent glands were also quite sound. Such a history as this could result in no other diagnosis than that of an innocent and independent growth, which, as already stated, it turned out to be.

CASE 5.—*False cystic adenocele of the breast; excision; recovery.*—Mary A. W——, æt. 20, a healthy and single servant girl, was admitted into Guy's Hospital on March 26th, 1861, under my care. She was a servant, and had enjoyed good health, her catamenia being regular. Three and a half years previously she first accidentally discovered a tumour in her right breast; it was about the size of an egg, situated in the centre of the breast, behind the nipple, and did not cause her any pain. When she first applied to me, eighteen months before her admission, the tumour was the size of a small orange; it was perfectly globular, and of a firm nature; and in my note-book at that time I had marked the case as being one of cystic disease. The patient then disappeared from observation, and did not reappear till six weeks before her admission into Guy's Hospital.

During this period the tumour had increased very slowly, but latterly, its increase had been very rapid, and accompanied with considerable pain; for three weeks, also, she had experienced a discharge of a bloody fluid from the nipple, which could be increased by pressure upon the part.

The tumour was very large, measuring fourteen inches in diameter and twenty-two in circumference. It was globular, with the nipple in the centre; moveable, and uniformly elastic, fluctuation being easily perceptible. The skin was much thinned from mechanical distension, and on its outer side was red and inflamed. The gland could not be separated from the tumour.

On March 15th I tapped the tumour, and drew off a quantity of bloody serum and broken-down tissue, but to allow of its more ready evacuation, the opening was enlarged, when the finger without force broke up a large portion of the growth. Two and a half pounds of this material were taken away.

The largest portion of the tumour was, however, of a more solid nature, necessitating its removal by excision the following day. The breast-gland was then found to be intimately connected with the tumour, and was spread over it, its removal with a large portion of the integument being required. The patient's convalescence was very rapid.

On making a section of the tumour through the nipple and its centre its true nature was clearly revealed, and it proved to be an example of " sero-cystic " disease of the breast. At its lower part were many beautiful examples of intra-cystic growths, which readily turned out of their capsules; about the centre were similar growths infiltrated with blood and breaking down, and in the upper part little else than extravasated blood and clot were visible. Microscopically, all the elements of the fibro-plastic tumours were present, with badly formed cæcal termination of the ducts, as found in the true adenocele. (*Vide* Model 40[10], Guy's Museum.)

Remarks.—In the above case the disease was situated behind the breast, and, as it has been shown, independent of it; the true gland was spread over the new growth, and had no other connection with it, although when coming under observation it was impossible to separate the one from the other. The tumour occurred in a young woman and in a single one, having commenced between the age of sixteen and seventeen. It was of slow growth at first, but subsequently became more rapid, when cysts began to make their appearance. The discharge of a bloody fluid from the nipple was a point of considerable interest. The diagnosis of the simple nature of the growth was never difficult, the character of the tumour, the history of the growth, and its manipular indications, with the absence of any other symptom which could excite any suspicion of its malignant nature, forbidding an error in diagnosis being made.

CASE 6.—*Cystic adenocele, with intra-cystic growths sprouting through integument.*—S. S——, a childless married woman, æt. 56, was admitted under my care into Guy's Hospital on July 11th, 1863. She was a healthy looking woman, and had been the subject of a mammary tumour for five years; it had

primarily appeared as an independent moveable tumour, and had gradually increased. When she came under observation for the first time, two years previously, a distinct separation between the new growth and the breast-gland was to be observed, but at the date of her admission no such distinction could be made.

The tumour was very large, and the skin much distended, one part having given way two weeks before her admission, and through this projected some intra-cystic growths. The margins of the opening in the skin were quite healthy. The breast was excised on May 19th, and a good recovery followed.

The disease was a splendid specimen of the ordinary cystic disease. (*Vide* model, Guy's Museum, 40²⁰.)

Case 7.—*Carcinoma fibrosum of right breast; disappearance of local disease by natural processes.*

H. B——, a healthy looking childless married woman, æt. 53, residing at Woolwich, came under my observation in January, 1859, with an ulcerating carcinomatous tumour of her right breast.

The disease had existed six years, and had been ulcerated for four, the ulcer at the time of her application being about the size of the palm of the hand. The growth was remarkably hard, and was firmly fixed to the muscles beneath. The axillary glands were also enlarged.

Her general health was very good, and no history could be obtained of any hereditary predisposition to cancerous affections. As the tumour excited little pain, she rejected its removal by caustics, and tonics were therefore given, water dressing being applied to the wound.

On March 3rd, 1858, the tumour had become much smaller, and several pieces the size of nuts had fallen off, having apparently been destroyed by the contraction of their own fibres; the growth was also considerably harder. General health still good.

May 25th.—Several tubercles had appeared in the region of the sternum and axilla. Another mass had fallen off, and the growth appeared to be withering. Health still good.

October 20th.—Much the same. The tubercles in the skin

are evidently enlarging; the original growth, however, goes on contracting.

December 30th.—Going on well. Tumour still contracting and crumbling away.

April 21st, 1859.—Tumour continuing to contract and to throw off pieces. Tubercles in the skin also becoming smaller.

November 20th.—Growth still smaller. Health good. No fresh tubercles. Axillary glands smaller and more indurated.

March 30th, 1860.—Large portions still fall off; growth contracting rapidly. Health good.

July 23rd, 1861.—Breast has nearly cicatrized, a mere linear cicatrix remaining, in which are one or two small tubercles. All the secondary tubercles of the integument have disappeared.

January 3rd, 1862.—Nearly cured.

June 1st.—Only one small piece, the size of half a nut, remains in the cicatrix. No fresh tubercles have appeared. The indurated glands in the axilla are hardly to be felt.

March 31st, 1863.—Breast shows merely a cicatrix, in which there is only one small nodule, the size of a pea. Otherwise the woman is quite healthy.

July 20th.—No change since the last report.

May 30th, 1864.—Breast is still in the same condition; one or two tubercles have appeared in the integument near the cicatrix, and have again disappeared. Two, however, are still present.

June 30th, 1864.—Patient much in the same condition. Her general health is good in every respect. Her local disease causes her no pain nor inconvenience. She considers herself to be well. One or two small tubercles still, however, exist in the integument.

Remarks.—This case is one of unusual interest. There is no possibility of an error having been made in the diagnosis, for the tumour and ulcerating surface presented all the features of a cancerous growth, and the natural history of the affection well confirms the idea then formed from its local appearances. The irregular surface of the ulcer, the induration and infiltration of the gland and integument, the enlargement of the axillary glands, and the presence of the characteristic tubercles in the

skin of the neighbourhood, were alone sufficient to indicate the true nature of the disease, and the repeated microscopical examination of the pieces of tumour as they crumbled away, with its cell structure, readily confirmed this opinion. The gradual crumbling away of the cancerous structure, from the steady contraction of its own fibres, is a point of great interest, as it is one of rarity, and it was a striking feature of this decay to observe how the growth from a florid colour gradually became pale and anæmic, till it was at last thrown off.

The tubercles in the integument also passed through like changes as they gradually disappeared, the pink tubercle becoming white, and then by degrees fading away.

The cancer has now existed a good twelve years, and shows no signs of spreading nor of involving any internal organs, for the woman's health is in all respects good, and the local disease is now as torpid as it has been for many months.

THE

STEREOSCOPE,

AND

STEREOSCOPIC RESULTS.

By JOSEPH TOWNE.

SECTION V.

VARIOUS as are the theories which through succeeding periods have been advanced in explanation of the phenomena of vision, they may all, however adverse or conflicting they appear, be resolved into a question of physical or psychical agency. Those who have adopted the latter view appear to have regarded the eye as a mere instrument of signs or signals, these signs requiring not merely to be interpreted, but also to be arranged, adjusted, and controlled, by an overruling action of the mind; and so largely have some philosophers relied upon psychical agency, that it would seem difficult to determine how much of the visual function to attribute to the mind, and how much, or rather how little, to ascribe to the eye.

While those who have adopted the anatomical theory, maintain that the structural arrangements of the organs of vision furnish an adequate solution of the phenomena of vision, the psychical theory has certainly gained much support, and is *apparently* confirmed, by the striking results obtained by means of the stereoscope; and so greatly has the introduction of this instrument influenced the theory of binocular vision, that it would scarcely, perhaps, be too much to state, that men have learned to read the phenomena of vision through the stereoscope. Certainly, wherever the philosophy of vision is taught,

there the stereoscope is found, and there the experiments of Professor Wheatstone are referred to. So great, indeed, has been the effect of these celebrated experiments, that they have tended, we venture to think, to lure more than one eminent physiologist from the consistency of his own conclusions.

To illustrate this fact, forms no part of the task we have undertaken; but that there is an apparent inconsistency exhibited in the writings of some distinguished physiologists, when they attempt to engraft the stereoscopic theory upon their own views, or to reconcile stereoscopic appearances with their own observations, is we think, susceptible of illustration. Whether the incongruity alluded to, be connected with the inherent difficulties of the subject, or whether some additional perplexity may not have arisen, from a vain attempt to amalgamate opposing theories, or perhaps, to reconcile truth with error, time will probably disclose.

Our own views on the subject of stereoscopic vision, and also with reference to the experiments of Professor Wheatstone, have been fully stated, and we think that enough has already been advanced to justify further inquiry.

Having in previous sections adduced a series of experiments, in proof of the existence of a necessary physiological connection, between those tracts of the retinæ which in ordinary vision receive similar impressions; we may now press our inquiries somewhat further, with a view to ascertaining whether the same perfect reciprocity of action, can be shown to exist between very minute portions of reciprocating parts of the retinæ; in other words, we propose in the present communication, to offer a few observations connected with the theory of identical points. This theory assumes that an object is seen single, because its pictures fall on corresponding points of the two retinæ, that is, on points which are similarly situated with reference to the two centres, both in distance and position, *corresponding points of the two pictures, falling on corresponding points of the two retinæ.* This is an old theory, and includes amongst its advocates the names of Newton and of Müller. Previous, however, to offering any illustrations of our own, it becomes necessary to allude to the experiment introduced by Professor Wheatstone, in proof that no necessary physiological connection exists between corresponding points of the retinæ.

This experiment[1] demands our consideration, not only because the conclusion drawn from it by Professor Wheatstone and some others, forms an *essential* part of the stereoscopic theory, but also because it is connected with a question most important in these investigations. " I have," writes Professor Wheatstone, " given ample proof that objects whose pictures do not fall on corresponding points of the two retinæ may still appear single. I will now adduce an experiment which proves that similar pictures falling on corresponding points of the two retinæ may appear double and in different places. . . ."

This experiment, it is added, affords another proof that there is no necessary physiological connection between the corresponding points of the two retinæ.

In this passage, the author clearly indicates the basis on which the stereoscopic theory rests, and points with great distinctness to the data on which he relies :—" Objects whose pictures do not fall on corresponding points of the two retinæ may still appear single, and similar pictures falling on corresponding points of the two retinæ may appear double; *therefore*, there is no necessary physiological connection between corresponding points of the two retinæ. As might be anticipated, the phenomena alluded to in both cases are very nearly allied. Those experiments which bear with the greatest force upon the former observation, namely, that objects whose pictures do *not* fall on corresponding points of the two retinæ may still appear single, have already received our notice, and the results which Professor Wheatstone refers to psychical agency have been clearly traced to physical causes. (See Section I, ' Guy's Hospital Reports,' 1862.) The experiment more specially referred to above, has also received our attention, and the result of our most careful investigation is that in this instance, we are compelled to doubt the accuracy of Mr. Wheatstone's observations ; and we are impressed with the idea, not merely that the experiment referred to has been misconstrued, but also that it is inadequate to sustain the conclusion it has been supposed to justify. The experiment is thus described by Professor Wheatstone :—" Present, in the stereoscope, to the right eye a vertical line, and to the left eye a line inclined some degrees from the perpendicular ;

[1] ' Philosophical Transactions of the Royal Society of London,' 1838, p. 384.

the observer will then perceive, as formerly explained, a line, the extremities of which appear at different distances before the eyes. Draw on the left-hand figure a faint vertical line, exactly corresponding in position and length to that presented to the right eye, and let the two lines of this left-hand figure intersect each other at their centres. Looking now at these two drawings in the stereoscope, the two strong lines, each seen by a different eye, will coincide, and the resultant perspective line will appear to occupy the same place as before; but the faint line, which now falls on a line of the left retina, which corresponds with the line of the right retina on which one of the coinciding strong lines, viz., the vertical one, falls, appears in a different place. The place this faint line apparently occupies is the intersection of that plane of visual direction of the left eye in which it is situated, with the plane of visual direction of the right eye, which contains the strong vertical line."

Not only does this experiment appear to us inadequate to the conclusion it has been supposed to justify, but we must further confess to being quite incapable, of seeing the result as described by Professor Wheatstone. It is, however, unnecessary that we should discuss this question; first, because we are ready to concede all that Professor Wheatstone believes himself to have seen in the result thus obtained, and also because this experiment has already been submitted to a thorough analysis by Ewald Hering.[1] We must, however, state that the conclusion at which this distinguished physiologist, arrives is in perfect conformity with our own observations, which observations were made before we had seen those of Professor Hering. We are induced to state this fact, not from a desire to secure any originality to ourselves, but only to show the perfect uniformity of result arrived at by two independent observers, and we venture to believe, did time and opportunity permit a revisal of this experiment, that our view would be endorsed, by the author of the stereoscope himself.

The following experiments are brought forward, as additional evidence in proof of the existence of identical light-receiving points upon the two retinæ, and of the perfect identity of action and of sensation which exists between them.

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[1] 'Beiträge zur Physiologie von Ewald Hering;' Zweites Hef., " Von den Identischen Netzhautstellen." Leipzig, 1862.

They also exhibit the effect of colour upon the retinæ, and illustrate the influence of colour sensation, upon the phenomena of binocular vision.

Slide 1 represents two stars, one to be presented to each eye, the stars being figured in minute points. The image for each eye is to be divided into two symmetrical halves, the one half consisting of red points, the other half consisting of black points; the centre point of each figure is to be exactly opposite the axis of the eye of the corresponding side; the two halves placed within the visual lines, that is to say, the inner half of each star, to be figured in black points; the two halves placed to the outer sides of the visual lines to be figured in red points, and it is required for the perfection of this experiment that the points forming the star of the one side shall, in position and size, be identical with the points forming the star of the opposite side. (Fig. 1.) Viewed in the stereoscope, there will be no double images or confusion, but as an instantaneous result; one single star, in colour a combination of the red with the black.

Slide 2.——For our next experiment the slide may consist either of sheet lead or of cardboard, and the figures are to be represented by small perforations or pinholes, instead of points of colour, taking care that the perforations for both stars are as nearly as possible the same. When viewed, the stereoscope is to be closed, to prevent the admission of side light, and held up to the window. The result will be instantaneous blending of the two figures, the resultant star consisting of bright luminous points.

Slide 3.——We have now to repeat the first experiment, subject to modification with reference to colour; that is, for the black and red of the former, we substitute blue and yellow for the present experiment, the back ground of the slide, in this instance, being of vermilion. Viewed in the stereoscope, the effect will be dazzling, and very perplexing to the eyes. Over the greater portion of the resultant image, the spots will appear double, the blue and yellow spots lying side by side, while in other parts of the figure there will be constant alternation ; *but in no part will the discordant colours blend, or the two images be permanently superposed ;* in short, the result

may be thus broadly stated—that we have in this instance a double star, or rather a star composed of double rows of spots, excepting where the images occasionally alternate.

Slide 4 gives a portion of the star; one half of each figure is represented in blue, the other half in yellow spots, the different colours being so arranged that they fall upon identical points of the retinæ. This slide is introduced for the purpose of conveying more perfectly than by description it would be possible to convey, the striking effect occasioned by simultaneously presenting discordant colours to identical points of the two retinæ. (See Fig. 2 of the Plate.)

Slide 5 consists of figures similar in *form* to slide 4, but differing in two important respects. In slide 4 the two figures are, both in form and position, identical, and fall upon identical points of the two retinæ. In slide 5 the two figures differ considerably in *magnitude*, but are identical in *colour*. This slide is introduced to show, that if the *colours* of the two figures harmonise, the retinal images will be *adjusted* and *equalised*, although between their respective *forms* there may exist a marked discrepancy. (See Fig. 3 of the Plate.)

Slide 6.——If a slide be prepared having two rows of spots, each row containing three spots, one in the centre and one on either side, so arranged that the centre spot of each group is opposite the axis of the eye of the corresponding side, the spots being coloured alternately red and black, the spot opposite the axis of one eye is to be black, and the spot opposite the axis of the other eye is to be red; and in addition to the spots already described there are to be two other spots, one over or above the central spot of each group, that for the one eye being red, and that for the other eye being black, making in all a group of four spots for each eye. A slide thus prepared, as in the annexed figure, and viewed in the stereoscope, will present the appearance of four single spots, perfectly uniform in colour,

the colour being a combination of red with black ; there will be permanent superposition of all the images, with perfect freedom from visual disturbance.

Slide 7.—This slide is precisely similar to the last, with the exception that the colours for the two lozenge-shaped spots are for the one eye blue, and for the other eye yellow. Viewed in the stereoscope, there will appear, not as in the previous experiment, four spots seen in their right places, but, under these circumstances, six spots will appear ; the two spots that fall on the axes of the eyes will not remain superposed, but the one will be seen to slide off from the other, and they will appear at some distance from each other, while the two lateral spots will pass, the red to the red and the black to the black.

It is to be observed, that this experiment supposes the foci of the two retinæ to be the same, and that the retinæ possess the ordinary susceptibility to the colours employed ; but where these conditions have been wanting, we have still found, by adjusting the antagonising spots to the individual peculiarly, that the desired effect has been obtained. The slide we have used has dark stone or London clay colour for the back-ground, vermilion and lamp-black for the spots forming the principal groups, with lemon chrome for one and ultramarine for the other of the lozenge-shaped spots.

We are now to pass under review, the several experiments which have been described ; and, as a fitting introduction to our observations, we avail ourselves of the following extract :

"Although each elementary part of the retina represents a distinct portion of the field of vision, yet the different elementary parts, or sensitive points, of that membrane have a certain influence on each other ; the particular condition of one influencing that of another, so that the image perceived by one part is modified by the image depicted in the other part."[1]

[1] Muller, vol. ii, p. 1185. We introduce this extract to show how perfectly the phenomenon referred to, was recognised by the author, but not, as will hereafter appear, as an exposition of our own views respecting it.

It is remarkable that the phenomenon referred to in the above extract does not appear to have received the attention of Professor Wheatstone, and yet no fact connected with stereo-scopic observation is more demonstrable than this ; and if we mistake not, it furnishes a key to those phenomena which appear to have perplexed, *if they have not misled,* the author of the stereoscope.

It is then, to this spreading of impressions upon the retinæ, to the intercommunication existing between impressions simul-taneously made upon corresponding parts of the two retinæ, and to the great importance of these phenomena, viewed in connection with the physiology of binocular vision, to which we now desire to direct particular attention. Our aim in the foregoing experiments has been, to prove the existence of two distinct forces in connection with the retinal impressions ; and so important do we consider this point with reference to the phenomena of vision, that if it be ignored or disregarded, such omission will, we venture to state, explain almost any amount of misconception respecting results obtained by means of the stereoscope. The spreading or extending of the retinal im-pressions beyond the part primarily affected, has already received our consideration ; we have also previously observed, that the superposition of the retinal images is influenced by this property of the retinæ ; and further to show how mate-rially the impressions upon one retina can affect the corre-sponding part of the opposite retina, it has been proved that the colour of an image presented to one eye, will pass over and tinge an image presented to the corresponding part of the opposite eye. (See 'Guy's Hospital Reports' for 1862.)

We have found it necessary, in the course of our previous inquiries, to allude to these phenomena, but our observations respecting them have been incidental ; they are now to form the subject matter for further investigation.

And we first observe that the experiment brought forward to disprove the identity of action between corresponding points of the two retinæ, consists in simultaneously presenting dis-cordant impressions to identical points, and the result, *as read by Mr. Wheatstone,* is that portions of the respective pictures which fall on identical points of the retinæ are referred to dif-ferent places. Were the result obtained by his experiment

as clear as Mr. Wheatstone believes it to be, we must still demur to Mr. Wheatstone's conclusion; and we submit that such a result, thus obtained, would only prove that identical sensation points, cannot at the same time endure discordant sensations. The question therefore remains, and it is *the* question we now propose for consideration—must we accept such a result, thus obtained, as conclusive that there is no necessary physiological connection between corresponding points of the two retinæ? These are the thoughts that suggest themselves, with reference to the question before us, and to their more complete development the following observations are directed.

The figure selected for our first three experiments is a star formed by a number of distinct minute points; the centre of each star is to be opposite the axis of the corresponding eye, and they are to consist of symmetrical halves. In our first experiment one half of each star is to be figured in red spots, the other half in black spots.

The purport of this experiment is to exhibit in simultaneous, but separate action, a considerable number of corresponding points of the two retinæ, when submitted to *harmonic* impressions.

Viewed in the stereoscope, the instantaneous result is one star of uniform reddish black, presenting a perfect combination of the two colours employed. Those who deny the existence of corresponding points upon the two retinæ, adopt the hypothesis, that we see but one point single at the same time, namely, that point on which the eyes converge, and they consider that double images constantly present themselves, but that in consequence of the attention being directed to the dominant object, the mind does not perceive the duplicity of images. It is evidently incompatible with this theory, that the numerous points contained in the above figure, should at the same time be seen single; and it may be objected, that while the eyes are fixed upon any two of these spots, the upper and lower, or the lateral spots, may appear double, the double images being so faintly expressed that their duplicity is not observed. The reply would be, that it is highly improbable that the eyes can pass from point to point over the entire figure, not only without the consciousness of the individual, but also in direct oppo-

sition to his will; so too it is equally improbable, that the eyes of one accustomed to stereoscopic observation, would fail to detect the duplicity of the images, when, as in this instance, they would be so distinctly marked, that of the one eye being of black, that of the other eye being of red. Such an objection may indeed, exist in theory, but if submitted to the test of examination we think it untenable, and one which would scarcely be urged by any candid observer. Under the conditions of this experiment, and without the slightest visual disturbance, the entire figure changes in colour; that is, instead of appearing one half red and the other half black, as it appears to each single eye, we have a resultant image of one uniform colour, the colour being a mixture of the two; and in the perfect blending of the two colours in every point, of which the resultant image consists, we recognise an indubitable proof, of the existence of a necessary physiological connection between corresponding points of the two retinæ.

In the above experiment harmonic colours are presented to corresponding points of the retinæ. It is, however, important to observe the effect of submitting corresponding points to similar impressions, these impressions being *without* colour. With this view, we have adopted a slide in which the figures are represented in minute perforations; the result is a single image consisting of bright luminous points, a perfect fusion of all the points being instantaneous. The effect is more obvious, however, if half the figure for one eye—say, for example, the right eye—be represented in somewhat larger perforations than those which form the corresponding half of the figure for the left eye. Under these circumstances, if the slide be viewed first with the right eye closed, then suddenly opened, it will appear, as by a *flash*, a single *gush* of light, that all the apertures over one half of the resultant image become at *one* and the same *instant* perceptibly enlarged, with increased brilliancy; and, perhaps, no method could better than this, illustrate the identity of action between corresponding points of the two retinæ. The slide I have used contains for each eye one hundred distinct perforations; and doubtless as many more might be introduced, as could be distinctly seen, without in any degree disturbing the unity of the result.

In slides 4 and 5 we give a portion of the star, first

in disharmonic, and subsequently in harmonic, colours. In the former experiment the figures presented to the two eyes are *identical* in *form* and *magnitude*, but their *colours* are *disharmonic*. Under these circumstances, the images may for a second be brought together, but the yellow spots will be seen to slip off and recede from the blue, to form an irregular figure, bounded on either side by the blue, the result being *two distinct figures*, differing materially both in form and size, and appearing *in different places*. It is to be further observed that the resultant images are composed, not, as on the slide, the one half of blue and the other half of yellow spots, but they consist, the one image of blue and the other image of yellow spots, the spots of each colour respectively going to form a distinct image. In slide 5 the figures presented to the two eyes respectively *differ* considerably in *magnitude*, and cannot fall upon identical points of the retinæ; yet, notwithstanding this discrepancy in *magnitude*, the retinal images are superposed and *appear as one*. (See results, Figs. 4 and 5.)

We have yet to refer to slides 6 and 7. These two slides, in outline—that is, in the form, number, and position, of the images—are the same; the difference between the two slides, consists in the colour of two of the spots in slide 7 being disharmonic; but, slight as this difference is, the effect is remarkable. In both cases spots identical in form and position are presented to identical points of the two retinæ; in experiment 6, the result obtained is superposition of all the images, with a perfect blending of the two colours; in experiment 7, the colours in two out of the eight spots are disharmonic, and by the introduction of this slight element of discord, provided the discordant colours be adapted to the retinæ, every image in the field is displaced, and the entire group rearranged. If we observe the position of the objects with reference to the eyes, it will be apparent that the central spot of each group is placed opposite the axis of the eye of the corresponding side; in short, these central images not only fall upon corresponding points of the retinæ, but they fall upon the axes of the two eyes. So far, therefore, as identity of form and position of the objects viewed can command singleness of result, these are the conditions which ought to ensure that result; the contrary, however, occurs. Viewed

in the stereoscope, the two central images may for a short time be superposed, and for a brief space they can be observed in alternation, but they soon separate and appear in different places, after which all disturbance ceases.

Evidently, therefore, one of two things has occurred—either the central parts of the two retinæ must be referring their respective images to different places, *or the images must have changed their places on the retinæ.* That the latter is the true solution is, we think, sufficiently obvious, and is, indeed, *proved* by the fact that each image respectively belongs to the eye of the corresponding side, so that, beyond question, the images have ceased to occupy central positions upon the retinæ, and have passed to the nasal sides ; these tracts are non-identical, *therefore,* when this displacement has occurred ; the retinal disturbance ceases, and the images are no longer subject to alternation.

It would probably be difficult to devise an experiment more delicate than the one we are now referring to. It is required that the entire field shall be reconstructed, or every image displaced, by means of two spots of different colours, these spots being distinct from and placed above the principal groups. And in proportion to the delicacy of this experiment is the nicety required in conducting it. The result is dependent upon antagonism between the two lozenge-shaped spots, and the susceptibility of different retinæ to different colours is not precisely the same ; hence it would be impossible to prepare a slide for this purpose equally adapted to every observer. We will suppose the colours used to be equal in intensity and equal in quantity. If the susceptibility of the retinæ to the colours employed be also equal, the effect produced will simply be alternation between the two discordant images, while those forming the principal groups may remain undisturbed ; while, on the other hand, if there be too great preponderance in either colour, the more powerful will obliterate the weaker ; under these circumstances there is an absence of antagonism—it is simple mastery. Hence the nicety required in conducting this experiment, yet no result can be more clear or satisfactory, and it can be obtained under a variety of different circumstances.

We may here remark, how slight are the causes which will suffice to disturb the equilibrium of the retinæ, and none,

perhaps, have this circumstance so forcibly presented to their notice, as those who are much engaged in stereoscopic observations. It must, in the ordinary use of the stereoscope, have occurred to many persons, on viewing the same slide at different times, to have experienced that at one time they readily superpose the two pictures, while at other times they are unable to superpose them; loss of rest, very slight disturbance of the general health, excessive use of the eyes, any of these causes will sufficiently explain this circumstance; but the extreme susceptibility of the retina is, perhaps, never more remarkable than when conducting experiments relating to colour, and we have repeatedly found, that the very experiment which will fail on first rising in the morning, will perfectly succeed after breakfast has been partaken of. We may, however, observe, through all these slight varieties, depending upon individual peculiarity or individual condition, that a perfect uniformity of law obviously prevails; the effects may be modified, but the results, though variable, *are never contradictory; they may differ, but they constantly point to one and the same conclusion.*

In the experiments which have now passed under review, we possess a complete epitome of the whole range of stereoscopic results, and they tend, we think, to clear the phenomena of the stereoscope from the obscurity in which they have been hitherto involved.

In experiment 4, the images presented to the eyes fall upon identical points of the retinæ, but, the *colours* employed being *discordant*, singleness of result cannot be obtained.

In experiment 5, the images presented to the eyes do not fall upon identical points of the retinæ; still, their colours being the same, the images are superposed and appear as one. In the former example discordant colours, falling upon identical points, give rise to a *repellent action,* and occasion *displacement* of the *retinal images,* while in the latter example *identity* of *colour,* overrules *discrepancy* in *form,* and secures adjustment of the two unequal images. These facts would, we think, appear to justify the conclusion, that the phenomena connected with the superposition of the retinal images, are connected with two distinct forces, and that these forces *are distinct* is exemplified in those experiments, where they

are brought into antagonism ; and, when subject to the con-
ditions of these experiments, colour sensation gains the ascen-
dancy. We must not, however, be understood to imply, that
the identity of action existing between corresponding points of
the two retinæ, is dependent upon colour sensation ; on the
contrary, we believe this property of the retina to be inherent
and primary, and regard colour sensation as a subsidiary force.
We have, indeed, proved this in experiment 2, where the
figures consist of small perforations, and when viewed are
represented in points of white light.

What we desire to state is, that corresponding points, quite
irrespective of colour sensation, are identical in their action ; yet,
this identity of action, being influenced through the agency of
colour sensation, it results that discordant colours simultaneously
referred to corresponding points, will disturb or annul, while
harmonic colours will assist or maintain it ; hence, where there
is a want of harmony, between two images simultaneously referred
to corresponding points of the retinæ, such discordant images may
be thrown off from corresponding points, that is, they may be dis-
placed upon the retinæ ; and again, that images, though they do
not fall upon precisely corresponding points, will, their colours
being the same, be drawn towards each other, or rather towards
corresponding parts of the two retinæ, until they reach identical
points, so that in the former case, images presented to identical
points may appear in different places, and in the latter case,
images that do not primarily fall on precisely identical points,
may be brought together and appear as one.

We think we have succeeded in proving the identity of
corresponding points upon the two retinæ, but still it may
appear, that while doing so, we are but drifting into a dilemma ;
for if there be identical sensitive points upon the retinæ, it
would seem to be essential to singleness of result that the images
falling upon identical points, should themselves be identical.
Still, it is clear that in ordinary vision this condition cannot
always be secured, and with reference to this apparent dis-
crepancy between the structures provided and the function to
be discharged, we may now offer one or two additional re-
marks.

It is very observable, that colour and form, although coexist-
ing through all nature, are in reality distinct qualities ; in the

retinal images, as in natural objects, these two distinct quali-
ties are in combination, *the latter being subject to the laws of
perspective ;* and it is clear that in connection with this fact,
there are disturbing causes which must in degree, so far as re-
gards *form,* affect the identity of the two retinal images ; some
of these disturbing causes are contingent, while others are
constantly in operation ; for example, excepting when an image
is placed precisely equidistant from the two eyes, there will be
some difference between the perspectives referred to correspond-
ing parts of the retinæ ; here, then, in the difference between
the two perspectives we perceive a constantly recurring cir-
cumstance, which must in some degree interfere with the
identity of the two impressions. The difference arising from
this cause will, it is true, be slight, but still it exists. Again,
how frequently do we find the foci of the two eyes unequal ;
here also we have a source of disturbance, or rather one which
would prove a source of disturbance, were there no provision to
meet such contingencies ; but in connection with the patho-
logy of vision, we have these disturbing causes excessively
developed, and the phenomena to which we refer are beauti-
fully illustrated by means of the stereoscopic test for the
retinæ. (See ' Guy's Reports,' 1863.) Subject to this method of
examination, the great tracts of the retinæ are brought into
separate action, so that we have a single field resulting from
non-corresponding halves of the two retinæ ; under these cir-
cumstances it is found, and this not unfrequently, that one
half of the field will be referred to a point considerably higher
or lower than the opposite half, or it may be that the two
halves slant from, or, perhaps, that one overlaps the other,
these results being manifest when non-corresponding halves of
the retinæ are brought into simultaneous action, while, if the
entire of both retinæ be brought into simultaneous operation,
the reciprocal influence of corresponding parts upon each other
will generally correct this want of coincidence, so that the
patient remains unconscious of the circumstance, and usually
suffers no inconvenience from this cause.

The problem before us is—given a system of corresponding
points upon the two retinæ; whether the identity of corre-
sponding points, involves, as a condition essential to singleness
of result, that there must also exist a perfect identity between

the images simultaneously referred to corresponding parts of the two retinæ.

The retinal pictures we have observed, include two distinct qualities—form, and colour; the experiments before us show that these qualities are connected with two distinct forces. The question then arises, are both of these forces liable to disturbance, or but one. If but one, which of them? And it is evident, we think, that the causes, which in ordinary vision tend to disturb the identity of the two retinal images are connected *exclusively* with form, since it is obvious that in form there will, from natural causes, constantly exist a slight discrepancy between the retinal pictures; while, so far as relates to colour, there can be no discrepancy, since images transmitted from identical objects must in colour be identical.

The conclusion at which we have arrived, is that there are two distinct forces in operation—the one connected with form or direction, the other with colour; that connected with form, we remark, is liable to disturbance, while that connected with colour is fixed and uniform. Hence it appears that a system of identical points would, from causes *external to the eye,* be rendered nugatory, if not obstructive, in the absence of a subsidiary force such as we have observed in connection with colour. And in the identity of colour sensation may, we think, be discerned a compensation for that discrepancy which in ordinary vision must constantly occur with reference to form.

Our remarks, thus far, have been limited to the reciprocal action of corresponding parts of the two retinæ. If, however, we turn our attention to the single retina, it will be found that the phenomena of monocular vision tend to confirm our previous observations, and it will also be evident that the quotation we place at the head of these remarks (p. 131) does not embody the facts or suggest the conclusions deducible from the foregoing experiments. By referring to Sec. III of these communications,[1] it will be found, that we there dwelt at some length upon the *distinctness* of non-identical tracts of the two retinæ, and proved by experiment that these tracts may be simultaneously submitted to the most discordant impressions, without giving rise to the slightest visual disturbance. It remains, now that our views are sufficiently developed, that we

' Guy's Hospital Reports,' 1863.

briefly revert·to the quotation above referred to, and it will be apparent that the author does not adequately express the phenomenon to which it refers :—" That an image upon one part of the retina affects an image upon another part of the retina, is not the idea we have desired to convey, neither is it consistent with the facts before us ; what we desire to state, is something more and very different from this ; it is, that between corresponding points of the two retinæ, there exists a perfect identity of sensation ; while, on the other hand, if each retina be regarded separately, there is an entire absence of this property, so that an image upon one part does not in the slightest degree affect an image upon another part. Hence, that perfect sympathy which exists between corresponding halves of the two retinæ, has nothing analogous in the two halves of the single retina ; and if we bear in mind that in monocular vision each half of the retina receives its picture from the opposite half of the external field, so that their respective impressions are perfectly distinct, but little consideration is required, to show that this fact is connected with very interesting and important results, for if each retina respectively were subject to the spreading of impressions beyond the part primarily affected, so that the colour of an image depicted upon one part, could influence an image depicted upon another part, it must follow, that vision with one eye, would be constantly perplexed through the antagonism of discordant colours ; but under existing circumstances, the two halves of the single retina being, as the two halves of the external field, *perfectly distinct*, we are enabled to view with one eye and in close proximity, colours of the most discordant kind, without exciting the least retinal disturbance, while on the other hand we cannot with impunity, regard discordant colours if simultaneously referred to corresponding parts of the two eyes.

It remains, therefore, with those who deny the existence of a necessary physiological connection, between corresponding points of the two retinæ, to explain how it comes to pass, that any state or condition existing in a point of one retina, occasions a similar state or condition in the corresponding point of the opposite retina, while no such reciprocal influence can be shown to exist, between any two portions of the same retina.

DESCRIPTION OF PLATE

Illustrating Mr. Towne's Observations on the Stereoscope.

Fig. 1. These are figures of stars in which identical points of the retinæ are simultaneously submitted to harmonic colours. The blending of the two colours may be observed by comparing the spots that form the *star* with the larger spot, which, when viewed in the stereoscope, appears over the centre of the resultant image.

Fig. 2. These are figures in which identical points of the retinæ are simultaneously submitted to discordant colours, — displacement of the retinal images results.

Fig. 3. Consists of figures identical in *colour*, but differing in *magnitude*, showing that if the *colours* of the the two figures harmonise the retinal images will coincide, although they do not primarily fall on corresponding points.

Fig. 4. Represents the result of Fig. 2.

Fig. 5. Represents the result of Fig. 3.

Fig. 1.
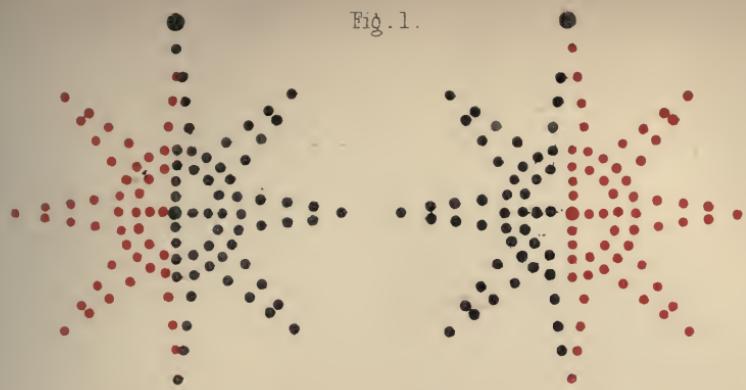
Fig. 2
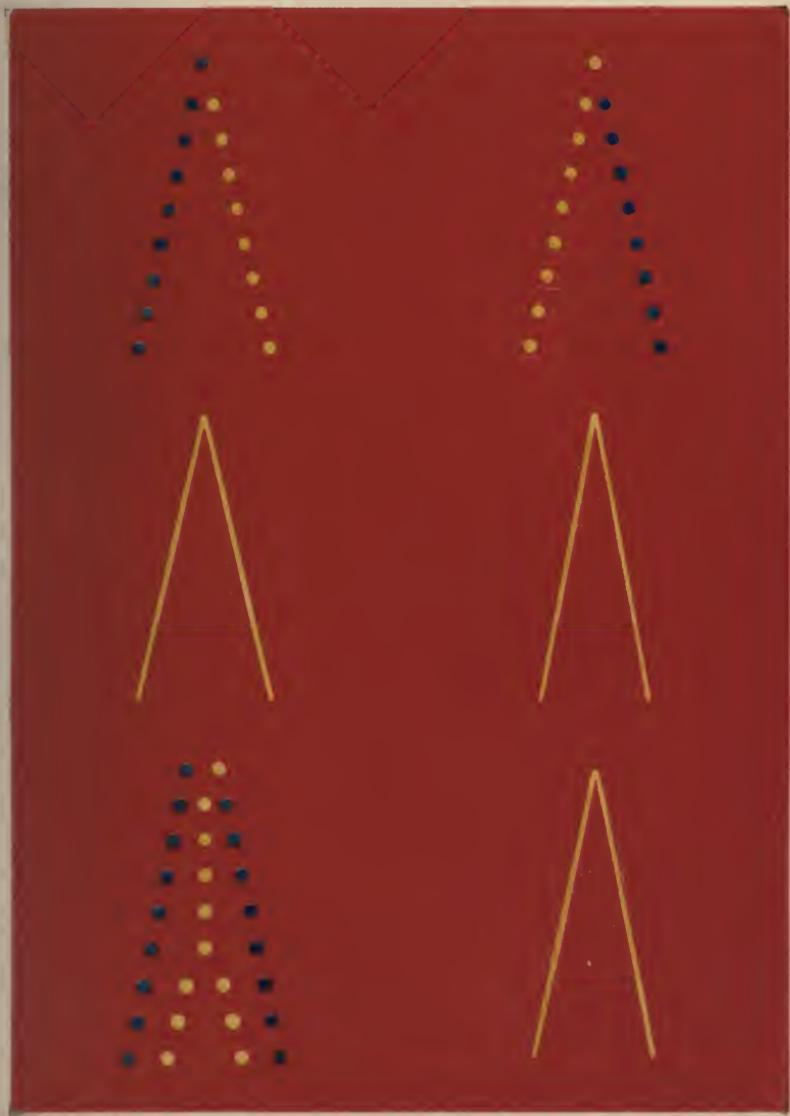
Fig. 3
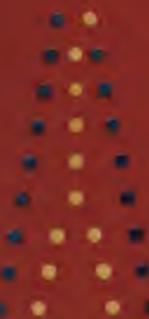
Fig. 4.   Fig. 5.

A CASE

INTESTINAL OBSTRUCTION,

OR

MODIFIED OBTURATOR HERNIA.

By J. COOPER FORSTER.

ARRANGED FROM A REPORT BY MR. HENRY BRIETZCKE.

SARAH T——, æt. 38, widow, with one child aged six years, was admitted into Dorcas Ward, on Thursday, March 24th, 1864, at 3.30 p.m.

On Sunday morning, the 20th of March, just after the bowels had acted, she felt a sudden pain in the abdomen, principally around the umbilicus; the pain has lasted ever since. She sent directly for a surgeon, feeling sure that something very wrong had happened. Some purgative medicines and hot fomentations to the abdomen were ordered. There was not any tumour discoverable in the groin. In the evening vomiting of a bilious character commenced, and has continued ever since. The next day (Monday) she remained much the same; vomiting, and in pain. On Tuesday evening two injections were given, but returned directly; no action on the bowels; pain very severe. On Wednesday she continued the same, and on Thursday came to the hospital.

On admission she stated that she had had a lump in her left groin ever since she was a child, but this used to disappear whenever she lay down, and never caused her any pain; in

fact, she hardly ever noticed it.   She was pale, with sunken features, distressed look, feeble pulse, and cold skin; complained of pain over the whole of the abdomen, not confined to any particular part, but feeling like a cord across the scrobiculus cordis; pressure in the left groin, even when severe, did not increase the pain; not any tumour to be detected; vomiting constant.   When seen on the evening on which she was first admitted she had rallied from the state of collapse. On examination the left external abdominal ring was found so large as to admit the tip of the index finger, which could be passed almost into the abdomen; she did not make any complaint of pain from this manipulation.

The abdomen was distended and tympanitic; pain not materially increased on pressure.   On the left side, and passing down into the iliac region, there appeared to be a distended piece of intestine, probably a portion of the small bowel; this part was dull on percussion.   Vomiting recurred every few minutes without effort, small quantities of dark bilious fluid being "gulped up."   Not any solid food had been taken since the 20th, and everything liquid was returned directly.   No action on the bowels.   Op. gr. j and Cal. gr. $\frac{1}{2}$ was ordered to be taken every four hours.   During the night she had three opium injections mixed with a little starch.

Friday, 25th.—In less pain, having been much relieved by the opium injections; very little sleep; vomiting continues; not any action on the bowels; urine very scanty.   Friday evening.—Says she feels worse, though not in so much pain, owing to the opium injections; pulse feeble, skin cold, tongue furred; not any fever.

26th.—Pulse stronger, 117; countenance much distressed; speaks in a whisper; skin warm; vomiting continues; has taken a little brandy, which, in common with everything else, only keeps down a few minutes; drinks much of iced water.

27th.—About the same; abdomen more distended and tympanitic; passed more flatus.

28th.—Ordered opium, gr. iss, every six hours, and wine, ℥iv, which is retained better than the brandy; no sleep; pain not so severe.   At 3.30 p.m. she was placed in a warm bath; and whilst immersed the abdomen was lifted out, and iced water poured upon it for about five minutes, when she became

faint ; she was then wrapped in blankets, and removed to bed ; during the evening she expressed herself as having found the greatest relief from these means, but no action on the bowels was produced.   Opium to be continued.

29th.—Vomiting decidedly stercoraceous.   Mr. Cock saw her, and thought the left inguinal ring should be examined. We accordingly cut down and exposed the parts of hernia, passing the finger to the peritoneal wall of the abdomen, but no hernia could be found, nor any evidence of a rupture having ever existed.   The wound was therefore closed with sutures.   Chloroform was given during the operation.   She gradually sank, and died two hours afterwards.

Post-mortem, twenty-three hours after death.—Early peritonitis ; vascularity of intestines, with slight exudation of lymph.   There was not any sac in the inguinal region.   A distended portion of small intestine formed the swelling which had been felt in the left side of the abdomen.   The colon and rectum were small and empty.   The greater part of the small intestines was much distended ; the lower part was contracted. The part constricted was a small loop of the lower portion of the ileum, near its junction with the cæcum.   On tracing the bowel downward this loop was found to pass through a constriction of peritoneum situated opposite the right obturator foramen, but within the abdomen.   By this band of peritoneum the bowel was contained in a perfect sac, and strangulated.   There did not, at first, appear to be any connection between the intestine and the obturator foramen, but subsequent investigation showed that there also existed a sac external to the foramen, and connected with the internal one.   This external sac was not of large size, but was very distinct ; it was continuous with the internal one at the upper part of the obturator membrane where the vessels pass.   The external sac was empty.

The knuckle of intestine contained in the internal sac was about two inches in length ; it was of a very dark colour, almost gangrenous, and filled with fæcal matter, and was so tightly constricted that a considerable amount of force could not dislodge it.   The broad ligament had not any part in the strangulation.

This case is to our mind one of extreme interest, and again

opens up the question of exploratory incisions into the abdomen
in cases of internal strangulation. We had previously been
disposed to take the view so ably maintained by Mr. Jonathan
Hutchinson, that the ill success attending this operation was
so decided that, upon the whole, it should be held inadmissible
in the practice of surgery, and we can only regret that we
were so far influenced by the results shown in Mr. Hutchin-
son's paper as to have abstained from resorting to a measure
which we believe the symptoms justified.

The suddenness of the attack, coupled with the previous
history, plainly indicated sudden strangulation of a portion of
intestine; but there was not any such strangulation, so far as
we could judge, at either of the outlets, or at any other point
where it could be felt. We need hardly say, indeed (what
has been omitted in the report furnished by Mr. Brietzcke),
that all the outlets were most thoroughly examined—the inguinal
and femoral regions, the obturator membrane, so far as prac-
ticable, the vagina, labia, rectum, and general surface of the
abdomen, every spot that could afford even the slightest chance
of a piece of intestine escaping from its proper position. All
our endeavours to elucidate the cause of obstruction were in
vain, yet it was perfectly certain, from the very marked cha-
racter of the symptoms, that a piece of intestine had become
suddenly strangulated. Neither was there evidence of previous
peritonitis, or pelvic cellulitis, or similar mischief, at any period
of life, which might have laid a basis for this sudden attack.
Nor were we thrown off our guard by the account of the left
inguinal swelling; the parts were so lax, the two sides so
symmetrical in appearance, and the whole course of the canal
so distinctly to be felt, that we had no doubt the patient herself
was in some error about that swelling, and it was only upon
the advice of our esteemed colleague Mr. Cock, and when the
woman was in a dying state, that, on the faint hope of finding
a clue to the symptoms, an exploratory operation was performed
in the left inguinal region.

There is no question that, useful as statistics may be, they can-
not possibly give us any help in determining the plan of treat-
ment to be adopted in any particular case, especially in such a
one as the present. When indications of internal strangulation
exist each patient must be treated according to the special

symptoms of his case ; and hence it becomes necessary that we should look for a particular symptom or group of symptoms which may be considered pathognomonic of a certain condition, and which may thus serve to guide us in our treatment. For instance, in the above case sudden and aggravated vomiting, with pain and constipation, accompanied with a peculiar constriction across the scrobiculus cordis, lasting twenty-four hours or more unrelieved, plainly pointed to a strangulated intestine. The evidence amounted almost to certainty, and, as such, would undoubtedly have justified us in opening the abdomen and making search for the source of constriction. We have ever since regretted, indeed, that the course was not pursued.

There is a remarkable specimen in the Guy's Museum, showing the result of this operation in a case somewhat resembling the preceding, and in which, had it not been so long delayed, could hardly fail to have issued very differently.

The case is concisely as follows, taken from the 'Catalogue :'

Miss ——, æt. 36, in September, 1847, had constipation for some days, and subsequently pains in abdomen. January 20th, 1848, was seized with vomiting ; purgatives were given, but with no effect. Constipation and vomiting continued, with indication of strangulation of the bowel, until the 1st of February, when Mr. Hilton made an exploratory incision into the abdomen, and found a knuckle of intestine entering the obturator foramen, on the left side. This he removed, but the patient rapidly sank and died in a few hours. On postmortem examination the strangulated portion was found in the abdomen, an inch and a half long, dark coloured, but not gangrenous.

Doubtless there are many obscure cases of constipation, attended with sudden and decided symptoms, simulating those related as occurring in our patient, in which it would be madness even to suggest an operation ; cases of constipation which have lasted many days, and even weeks, often with a previous history of peritonitis. To these cases we do not

refer ; but there is another class, though few and very ex-
ceptional, in which the suddenness of the symptoms and their
extreme severity plainly point to a sudden and severe disorder,
requiring decided remedial measures.

No doubt a tendency to fall into operative error would be
likely to befall the young surgeon, and time alone will enable
him to judge between the cases which should be treated by
general measures and those in which the knife is called for.

It is true that we are arguing from the result of the post-
mortem ; but the idea of the operation was current in our
minds whilst the patient was alive, though we were slow to
act upon it, influenced, as before said, by the remarkably un-
successful results of its performance hitherto.   A fatal peri-
tonitis, or one of the numerous other evils of opening the
abdomen, might have arisen had the operation been performed ;
but we see no greater reason to expect such untoward results
in these cases than in those of ovariotomy, in which the
abdominal cavity is opened and the intestine successfully
separated from the diseased ovary.   It must be remembered
also, that to free the intestine from its strangulated state was
the only means whereby the life of the patient could by any
possibility be continued.   A practice was adopted in our case
which demands a word of notice.   We allude to the placing
the patient in a warm bath, and applying the cold douche to
the abdomen.   We were led to try this plan, many years since,
in a severe case of constipation, when all other remedies had
failed, and the most marked success immediately followed.   It
was again tried by the late Dr. Hughes, at our request ; and
though in this case internal remedies were given at the same
time, it seemed to us that the successful result which followed
was mainly attributable to its use.   Hence its employment in
the present instance, unfortunately not with so good a result.

Another interesting matter in connection with this case is
its pathology.   How did the strangulation occur ?   We con-
fess that we have great difficulty in accounting satisfac-
torily for the exact position of the part.   The most probable
explanation appears to be that a small obturator hernia had
existed for some time ; that, after the strain of an evacua-
tion had passed off, this hernia was reduced by the action
of the obturator externus, that muscle being put on the

stretch owing to the position of the thighs; but that, instead of the piece of intestine being returned into the abdomen, it slipped under the peritoneum, between it and the pelvic fascia, much in the same way that the reduction *en bloc* occurs in the inguinal region. On dissection this appears to be the actual state of the parts, and we believe that it was produced in the manner stated.

This view of the origin of the very singular condition found derives confirmation from the contracted and puckered state of the sac, which protruded through the obturator foramen, and from its immediate continuity with the internal sac which was the seat of the strangulation.

DESCRIPTION OF PLATE,

Illustrating Mr. C. Forster's Case of Intestinal Obstruction.

    a.   The ovary.
    b.   The uterus.
    c.   The Fallopian tube.
    dd. The cut surface of the bones of the pelvis.

Plate

W. Hurst, ad nat delin.

M & N Hanhart, Imp.ᵗ
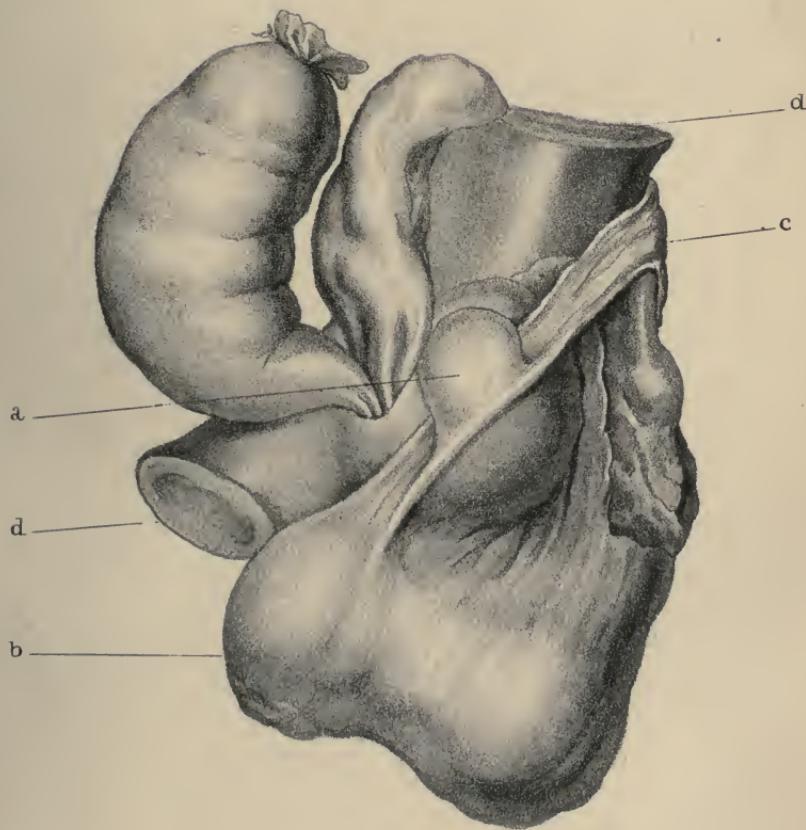
CASE OF ANEURISM,

SEATED ON AN ABNORMAL MAIN ARTERY OF THE LOWER LIMB.

By C. HILTON FAGGE, M.D.

BESIDES their practical importance from a surgical point of view, the variations in the distribution of arteries within the human body have considerable scientific interest. The regularity of their occurrence in certain positions shows that they are not merely accidental. The labours of Rathke, and of others, have made us thoroughly acquainted with the changes which precede the development of the aorta, and of its main branches. Mr. Turner, in the 'Medico-Chirurgical Review' for 1862, has made use of these facts to explain the different abnormalities which have been observed in these arteries. Up to the present time the mode of origin of the vessels in the limbs has not, I believe, been investigated. It cannot be doubted that the study of their development would explain the variations which occur in these parts also.

Among the very rarest of these abnormalities is the occurrence of a large artery, arising from the internal iliac, running down the back of the thigh, and terminating in the popliteal, as the main artery of the lower extremity. Only three instances of the presence of this artery have been recorded. This extreme rarity might, perhaps, be used as an argument against the supposition that its occurrence is due to the persistence of a fœtal condition. But in birds the artery of the lower limb normally takes this course; and it is well known

that the state of the vessels in the embryo, in different stages of its development, resembles that found in the lower animals.

The first instance in which the occurrence of this artery is known to be recorded is in the 'Lancet' for February, 1832, where Dr. P. H. Green describes such a preparation as existing in the museum of the Pitié, in Paris. Theile, in the 'Encyclopédie Anatomique,' 1843, quotes this account, but I have been able to find no other original notice of this preparation. The next person who observed a similar distribution was M. Caillard, who described it in his thesis in 1833, and deposited the preparation in the museum of the hospitals at Clamart, where, as I have been informed by M. Souchon, the aide-conservateur of the museum, it is still to be seen. It is remarkable that, though the preparation described by Dr. Green must have been close at hand at the time, M. Caillard does not seem to have been aware of its existence. I have not, indeed, been able to consult his thesis ; but M. Dubrueil, while quoting M. Caillard, and describing the preparation afresh from his own observation, makes no allusion to the existence of another specimen at La Pitié. One would almost be inclined to think that the two descriptions, the one written in 1832, the other in 1833, refer to the same preparation, were it not that Mr. Green speaks of it as existing on the left side of the body, whereas Caillard's specimen is undoubtedly one of a right limb. M. Caillard speaks of it as an instance of the " absence" of the femoral artery.[1] His description is the following :—" When it " (the artery which forms the continuation of the external iliac) " has reached four centimètres below the crural arch, it divides, giving off the two circumflex arteries, and lower down the perforating branches. Immediately after its division it diminishes in size, and is continued along the vastus internus, as far as the inner side of the knee, anastomosing with the articular branches." M. Dubrueil correctly observes that this terminal branch represents the superficial femoral artery in position, though not in size. It gives off a principal muscular branch (*grande musculaire*) which passes between the rectus and the sartorius ; and when it reaches the

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[1] 'Des Anomalies Artérielles,' Paris, 1847, p. 347.

foramen in the adductor magnus, instead of passing into the popliteal space, it traverses the anterior part of the tendinous ring, and is distributed as the a. anastomotica magna. M. Dubrueil gives two plates (Nos. XI and XII), representing the arteries of the thigh in this subject on the anterior and posterior aspect. He also quotes Theile's description of the preparation said to exist at La Pitié, and states that Theile derived his account of it from Froriep's 'Notizen,' but he seems to have had no suspicion that the observation came from France. He himself does not record any new example of this abnormality. Mr. Ellis is therefore in error when he states (in the paper referred to below) that this is the case. Mr. Ellis is also scarcely justified by the facts when he says that in all these examples the peculiarity existed in one side of the body only. Dr. Green says nothing at all about the state of the arteries in the opposite lower limb when describing the preparation seen by him in the museum of La Pitié. As I have not been able to refer to M. Caillard's thesis, I cannot say whether he observed the state of the arteries in the left thigh of the subject from which his specimen was taken. M. Dubrueil makes no allusion to it in his description.

The third instance in which this abnormality has been observed was in a case described by Mr. Ellis himself,[1] and which was in many respects remarkable. It was that of a man named Harvey Leitch, who had an extreme deformity of the lower limbs, and who left his body to Mr. Liston for examination. The femur was found to be deficient on both sides, with the exception of a small part of the lower end on the left side. The right tibia was remarkably deformed, and the muscles of the thighs were wanting, or altered in their attachments. On each side of the body the leading femoral vessel was absent from the usual place, and in its stead a large artery was developed at the back part of the thigh with the sciatic nerve.

The case which I have to record is in this respect peculiar, that the abnormal artery became the seat of the disease which led directly to a fatal termination. The examination therefore took place, not in the dissecting room, but in the post-

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[1] 'Med.-Chir. Trans.,' xxxvi, p. 439.

mortem room; and in consequence it was necessarily imperfect. The following is the history of the symptoms observed during life, taken from the careful notes of Mr. Bott.

J. C——, æt. 46, was admitted into Guy's Hospital, under Dr. Gull's care, on August 15th, 1863. She is a large, fat woman, a widow, and has had no children. Up to the last three months she enjoyed good health; since then she has complained of a dull, aching pain in the middle and posterior part of the right thigh. This pain has gradually increased in severity as well as in the extent of the region over which it is felt. It was so bad ten days since, that she could not move about, and at that time the leg began to swell. It is now not much increased in size, being a little larger about the knee, where the skin is much discoloured, and looks as if bruised. There is now very considerable pain at the inner and lower part of the tuber ischii, with some hardness and swelling. The pain also shoots into the vagina and labia. For three weeks she has had a white discharge from the vagina.

She was at first ordered M. M. c. M. S. c. Tinct. Camph. comp. ʒj, t. d. This purged her too much, and was soon given up. On August 21st the following medicine was prescribed;—Æth. Chlor. ♏xx, Aq. Camph. ℥iss, 4tis horis, and she was ordered to take ℥ss brandy also every four hours. On the 22nd it is stated that the leg was less painful, but on the 24th the pain was much worse, and she complained of formication in the right leg and numbness in the right toes. A good deal of relief was afforded on the 29th by the injection of gr. ss of Morph. Hydrochlor., in half a drachm of water, into the right thigh; but on the 31st the pain had returned; the leg was now drawn up in bed, and she could not straighten it without pain. There was a serous discharge from the opening into which the morphia had been injected. She kept a poultice applied to the thigh. On September 15th she was ordered Morph. Hydrochlor. gr. ss, bis die.; Julep. Iodinii comp., t. d. On September 9th it is stated that her condition was much the same. A discoloured patch remained where the morphia was injected. She was directed to apply half a grain of powdered morphia on lint to a blistered surface on the back of the thigh. This local treatment was repeated at intervals, and

gave great relief.   On the 18th she is described as " free from
pain, except when she moves and gets her legs pressed on."
At this time she suffered much from diarrhœa; her face also
became pale and her lips bloodless, so that it was thought she
must be losing blood, though she denied this.   She also per-
spired a good deal, and was very thirsty.   Her leg was very
painful on the day before her death, which occurred on Sep-
tember 23rd.   During the last few days the right lower limb
was noticed to be swollen.

The autopsy was made twenty-four hours after death.   The
heart was fatty, and the liver was loaded with fat.   The uterus
contained a large fibrous polypus, which filled its cavity.   The
other organs were healthy.

On laying open the gluteal region, a large quantity of blood
was found lying beneath the gluteus maximus.   Some of the
layers of fibrin were white and firm, and evidently of some
age, others were more recent.   The blood extended through
the sacro-sciatic notch into the pelvis, and also among the
muscles of the thigh towards the front.   It was partly in a
state of decomposition, and a large quantity of gas escaped
when the thigh was punctured.   On a careful examination of
the gluteal region a large vessel was found running parallel to
the sciatic nerve, and of about the size of the femoral artery.
Between the tuber ischii and the great trochanter there was
an elongated aperture in this vessel, by which its interior
had evidently communicated with an aneurism.   This opening
had a smooth edge, and the tissues round were condensed to
some extent as in an aneurismal sac, but it was impossible to
say whether or no this sac had been complete.   On tracing
the artery upwards it was found to enter the pelvis by the
greater sacro-sciatic foramen, but the parts were already so
much injured that it was impossible to ascertain the exact
mode of its origin from the internal iliac.

After the parts had been removed they were more care-
fully dissected.   As was expected, the large artery at the
back of the limb was found to terminate in the popliteal,
without receiving any branch, through the adductor magnus.
The femoral artery itself was small, and terminated in a
branch, apparently the superficial part of the anastomotica
magna, which ran near the internal saphenous nerve.

The popliteal vein, like the artery, was abnormal. It ran up for some distance on the posterior surface of the adductor magnus, and, after perforating that muscle, lay close to an artery of moderate size, which was apparently the termination of the profunda. This abnormal course of the popliteal vein is well known to occur not unfrequently. Mr. Quain gives a drawing of it in his plates of the arteries. A somewhat similar condition appears to have existed in a case recorded by Mr. C. Forster in the 'Guy's Hospital Reports' for 1857, p. 133, where a wound in the popliteal space, implicating the vein, caused death. The condition of the veins was not specially noticed in two of the cases, in which the main artery of the lower limb accompanied the sciatic nerve; but, according to Mr. Ellis, in M. Cailliard's case, the popliteal vein took exactly the course which it does in the specimen I am describing, and Mr. Ellis even suggests that it is not unlikely that this abnormal condition of the vein may be the rule in these cases.

It is remarkable that the popliteal vein was obstructed by a firm clot, evidently ante-mortem in its nature, which filled the vessel in its course through the popliteal space, up to beyond the point where it passed through the adductor magnus muscle. The wall of the artery appeared to be healthy in the greater part of its extent; a patch of calcareous deposit was observed on its inner surface at one point in the popliteal space.

It is much to be regretted that the examination of the arteries in the opposite limb was not thought of till it was too late. This and the incompleteness of the dissection, which was unavoidable, render imperfect the account of a case which, taken as a whole, is, I believe, unique. It is certainly remarkable that an aneurism, in itself not a very common accident, should affect an artery so highly abnormal as that which became the seat of disease in this case. It has been asserted that any part which varies from the natural state in any respect becomes thereby more prone to disease; but I doubt whether experience would confirm this statement so far as abnormal arteries are concerned. It is certain that a case so rare as this has but little force as an argument in support of such a view. I would rather account for it by considering how

exposed an artery lying behind the hip-joint is to accidents, to strain when the thigh is forcibly flexed, and to pressure during sitting. That a large artery should lie on the convex side of a joint is contrary to the rules which we find to be observed by nature in all parts of the body.

Plate illustrating Dr. Fagge's Case of Aneurism.

The drawing represents the appearance of the parts after they had been removed from the body and dissected. The following are the references. The parts are viewed from behind.

A. Abnormal main artery of lower limb.
B. Opening in the wall of this artery, to form the aneurism.
C. Popliteal artery.
D. Termination of femoral artery in the a. anastomotica magna.
E. Popliteal vein.
F. Fibres of adductor magnus passing behind the vein, above the point where it perforates that muscle.
G. Profunda artery.
H. Sciatic nerve.
I. Internal popliteal nerve.
J. External popliteal nerve.
K. Internal saphenous nerve.

A MEMOIR

OF A

REMARKABLE CASE OF DISEASE

(A NEW GROWTH)

AFFECTING THE SHAFT OF THE TIBIA.

By JOHN BIRKETT.

EVERY surgeon knows that the shafts of the long bones are frequently broken by trivial causes when their power of resistance is reduced by the development of any new growth which causes deterioration of their tissues. But the symptoms observed in such cases previous to the bone becoming broken are usually sufficient to enable the surgeon at once to discover the nature of the disease affecting the bone; and, even when asked to see a case of this kind for the first time immediately after the occurrence of the fracture, the history of the case affords ample and sufficient grounds for accurate diagnostication when coupled with other indications.

In the case to be related, however, many of the usual indications by which the nature of the disease may be detected were wanting; the progress of the growth was very different to that which commonly occurs, and the condition of the diseased bone showed changes which are very rarely indeed seen.

CASE.—C. W——, æt. 43, was admitted under my care into Martha Ward on August 4th, 1862, for the first time. She

was a very stout but otherwise healthy looking woman, a widow, and had borne children. Her occupation was a sedentary one, and she resided in the vicinity of the hospital. She had always enjoyed good health.

Whilst walking quietly along the street she believes she slipped and fell; however, upon attempting to rise, she could not, and felt that her left leg was broken. Being near the hospital, she was brought thither, and the injury seemed to be a simple fracture of the left tibia only, a little above the middle of its shaft. There seemed to be about the usual amount of swelling attending such injuries inflicted in the manner described, although a purplish tinge of the integuments over the site of fracture led to the belief that there was rather more effused blood than usual. Ordinary means were employed in the treatment of the fracture; but, after the expiration of about a month, when the usual amount of consolidation around the fragments had taken place, a swelling attracted notice on account of its persistence, rather than from any other circumstance. It appeared like a swelling arising from effused blood; it was situated over the front of the tibia, and was handled without giving pain. Now, for the first time, the patient stated that she had observed a swelling in that locality for about six months, which varied in size, had not given her pain, and for which she had never asked surgical advice. This history excited more attention. For, coupling together the circumstances that the tibia only was broken, that the fracture was occasioned by a trivial cause, and that there existed a persistent swelling, the diagnosis of a local disease of the bone was sought for. But, from the painless nature of the tumour, its remarkably defined form, and the healthy reparation of the fracture, such an opinion could be scarcely entertained without considerable doubt of its accuracy.

The union of the fragments of the bone was completed in about six weeks, and between the seventh and eighth week after the accident she left the hospital.

The tumour, however, remained, and did not appear to differ from what the patient herself had observed antecedent to the injury. She was subsequently able to walk about, although the limb was weaker than the other one.

She was again admitted into the hospital in June, 1863,

about nine months after being discharged, on account of the suffering she experienced in the leg at the site of the fracture. The tumour was rather larger than when she left the hospital; it measured about two and a half inches in its longest axis, which corresponded with the vertical axis of the shaft of the tibia, and about one and three quarters inch transversely. It elevated the integuments about half an inch above the level of the neighbouring parts. It seemed to be entirely confined to the face of the tibia. In fact, it resembled an ordinary node in its outline very closely. There was a purplish tint of the skin covering it. I carefully examined the swelling, with the view to discover an irregular fragment of bone which might, I thought, press upon some cutaneous nerve; but the bone at the site of union was perfectly smooth, and merely showed a very slight bulging on either side, which the recent repair seemed quite sufficient to explain. There was certainly an elasticity to be felt in the centre of the tumour, which led to the supposition that there might be fluid under the periosteum. When pressing it with the points of the fingers the sensation produced reminded one of those tumours developed within the antrum of the upper jaw, by which its walls are thinned and expanded. Soon after leaving the hospital the tumour became painful, the pain gradually increased, and now it was intolerable. It was continuous, although its severity was paroxysmal; it produced sleepless nights, she lost her appetite, and was unable, by any treatment, to procure relief.

At this moment I thought the disease was of inflammatory origin, and therefore treated it accordingly, with occasionally a slight remission of the suffering. I was in hopes that suppuration might take place, that a piece of the bone might exfoliate, and that, after the lapse of a few weeks, the nature of the disease would reveal itself. She was discharged from the hospital after a residence therein of a month, but slightly relieved.

After being at home about seven months she was again admitted in February, 1864. The swelling was not much altered. It was a little larger, and perhaps a little softer. But the pain she suffered was described as agonising, and she begged that any active measures might be taken, in the hopes of obtaining some relief. Having attempted to assuage the

pain by local and constitutional means, and utterly failing to
do so, I thought the moment had arrived when some light
might be thrown upon the nature of the disease by making an
incision into the swelling.

Accordingly, on March 3rd, I cut into the tumour, after
having divided the integuments in a crucial form. Before
really cutting into the new growth, I had to divide a dense
fibrous layer, which might or might not have been thickened
periosteum. An opening in the tibia was now exposed, which
is delineated in fig. I on the plate. Its edges were well and
sharply defined, the bone being as accurately removed as if
cut away with a chisel. Within the shaft of the bone, which
was somewhat expanded, there was a soft vascular growth,
easily excised, or rather scooped out. The elements, examined
with the microscope, were those commonly found in the
growths termed "fibro-plastic;" that is, there were oval, elon-
gated, nucleated cells, with a considerable quantity of delicate
fibre-tissue. Having removed a considerable quantity of this
new growth, I was able to pass my finger behind the tibia, and
I thought I could feel the tumour extending upwards and
downwards, and quite out of reach of further local treatment
without excising the central four inches, at least, of the shaft.
Local applications were applied to arrest bleeding, and for a
day or two there seemed to be slight hopes that the disease
might slough out. But in three or four days after the ex-
ploration the sufferings of the patient became greatly aggra-
vated, the growth increased, and seemed likely to form a large
fungating mass, and there appeared to be no other alternative
but the amputation of the limb.

To this proposition the patient readily gave assent, and the
limb was removed at the knee-joint on March 11th. The
operation was performed under the influence of chloroform.
The limb being very large and fat; a large anterior flap was
made, and whilst dressing the stump, the skin of about three
inches of its end was observed to become of a very different hue
to the remainder. For a short time it was of a dull purplish
tint, as if from venous congestion; then it became livid, and of
a paler hue than the other parts.

During the ensuing night vomiting was constant, the pulse
very feeble, and sleep was prevented by pain and restlessness.

The day following, the upper flap became gangrenous to an extent exactly correspondng with the surface of the skin the change in colour of which was noticed before.   Constant vomiting, not controllable by the means employed, exhausted the powers, and before the completion of the fifth day from the amputation the patient died.

The friends refused an after-death examination, but there never had been any symptoms indicative of visceral complications.

An examination of the amputated member was made soon after the operation, and a coloured drawing was executed by Mr. Hurst, from which the lithographs accompanying this paper were copied (Drawing 20[10]).   A preparation of the bone is also preserved (No. 1251[65]).

We may commence the description by stating that the soft parts of the limb surrounding the diseased tibia were perfectly healthy, and even not more than commonly adherent to it. Our observations, therefore, relate to the tibia only.   The fibula was quite healthy.   Referring to the tibia, we may first examine its condition as resulting from the repair of the fracture.   In figs. I and II the anterior and posterior surfaces of the tibia are represented; neither of them show very distinct traces of the union.   The lateral view (fig. III) does, however, show an oblique and somewhat curved line, which may be considered as the result of the repaired fracture.

The new growth is seen in fig. I to occupy the medullary cavity of the shaft of the tibia, and to have expanded its lateral walls, as their bulging indicates.   But on the anterior surface the compact tissue is destroyed, and a hole of nearly circular form is the result.   The bony edges of this aperture remain exactly as they were shaped by the action of the disease, although they really would seem to have been produced by some mechanical means.   This opening was covered over by a firm fibrous membrane, which I cut away at the first exploration of the tumour.

Fig. II represents the posterior surface of the tibia.   The compact texture of a part of it is expanded, and bulges con-

siderably towards the inside.   It was a thin layer of bone, which yielded, in places, to the pressure of the finger. Towards the peroneal border the bony tissue was destroyed where the darker lobulated mass is seen, and here the new growth was developed in cells of fibrous tissue or cystiform compartments.

In fig. III the preparation is viewed sideways.   It shows the amount of relief of the posterior surface of the growth, the projection of a bony growth on the anterior border of the tibia, and some well-defined fibrous cells, filled with the purplish, vascular, fibro-plastic growth.

Remarks.—In the observations we have to make on this highly interesting case we may surely fix the attention of the reader by noticing its most striking features in the order of their sequence.

When the patient was first admitted there was nothing, apparently, in the case to attract especial observation.   So many persons state that the fracture of the leg, on account of which they are admitted, occurred whilst walking along the street, that this explanation of the occurrence was listened to without exciting comment.   Besides, the great weight of the woman, for she was exceedingly fat, would contribute to render such an accident highly probable.   Very little deformity was visible, and the fragments readily remained in the position in which they were arranged, between sand-bags upon a pillow.   This was explained by the then assumed fact that the fibula was uninjured, for the limb was too large and fat to trace that bone.   The presence of the slight amount of swelling was also accounted for by the mode in which the injury was inflicted, there being no contusion of the soft parts such as happens when a bone is broken by direct force.   When the time arrived, however, at which all local swelling has usually subsided, and when, if there be deformity arising from displacement of the fragments, their projecting edges are usually felt, we could only detect a firm, regular fulness over the face of the tibia, and the very slightest irregularity along its borders.   Whilst commenting upon this swelling, expressing surprise at its continuance, unvarying outline, unchanging

colour, and suggesting various explanations of its existence, the patient then, and for the first time, declared that she had observed it for about six months. But, upon making careful inquiries, we were told that the swelling had been all along painless; and this must be regarded as the first striking feature of this case.

In due course the fragments of the broken bone unite; still, a swelling remains, but not so large as it was for a week or two after the injury. The limb gains strength; it is, of course, weak. So is every bone for some weeks after the repair of a fracture. In this, as it were, arrest of the new growth, another striking feature of the case requires notice. For who has not witnessed the rapid increase in the size of a limb soon after the bone, affected with carcinomatous growth, has been broken? But in this case, after a residence in the hospital of two months, the circumference of the limb scarcely exceeded its normal standard, and it could be placed on the ground without pain. Bony union was accomplished.

After nine months' absence from the hospital the woman returns thither. During eight months of that time she has had to endure great sufferings, but there was very slight alteration in the local disease. It was perhaps a little larger, to the touch it might be somewhat more yielding, and the tint of the integument was occasionally bluish. At this time various surmises were offered regarding the nature of the disease. It was suggested that it might be of inflammatory origin, periosteal, of the bone itself, or of both; there might be a fragment of dead bone, producing irritation; an abscess; and even carcinoma was considered; but the last was set aside as inconsistent with the usual progress of that disease after fracture of the affected bone. Every application of the various medicines administered failing to afford relief, she quitted the hospital after remaining therein about a month.

Seven months passed before she again applied to be admitted. During the whole of the time her sufferings had been great, steadily increasing. There was scarcely any change in the appearance of the local disease; but she now begged that something might be done to relieve the pain, and expressed her willingness to submit to any operation. The first thing suggested was to make an incision into the swelling,

and thus explore the interior of the tumour.   This being·
done, the character of the growth was at once revealed, and
through the opening in the tibia, after removing some portion
of the new structure which filled the medullary cavity, I
thought I could be certain that my finger extended into an
unlimited mass of some new formation, and among the soft
parts of the limb; but in this I was deceived.   For I sub-
sequently found that my index finger could not reach so far
as the thin bony shell circumscribing the disease.   In this,
too, we have a novel feature, since in all the cases of car-
cinoma hitherto observed the disease has not at this period
(twenty-five months) been confined to the affected bone only.

The disturbance of the growth excited inflammation and an
increase of pain.   It very soon sloughed upon the surface,
and by degrees grew out of the hole in the tibia.   In eight
days there was a large, fungating, bleeding, and sloughing
growth, which to remove without a considerable portion of the
shaft of the tibia was clearly impracticable.   Besides, at this
time it was impossible to know with certainty to what extent
the structures behind the tibia were implicated.   Amputation
of the member remained, therefore, as the only resource.   I
was induced to perform the operation at the knee-joint, in
order to avoid the section of the femur, the exposure of a
large surface of cut muscles, for the thigh was very large, and
that the patient might have a longer stump, to which an arti-
ficial limb might be more easily adapted.   I cannot admit
that the unexpected termination of this case would deter me
from repeating this mode of amputation, for the shape of the
stump was everything that could be desired, and its length
appeared much better suited to an artificial limb than the short
thick stump which follows amputation through the femur at
the junction of its middle and inferior third on a short and
very fat thigh.   Certainly the alteration in the vascularity of
a part of the necessarily long upper flat was very remarkable,
for the variation in its colour, which was noticed by several
bystanders, was due to the state of its capillary vessels; but
parts of the other flap sloughed also, therefore it is to the
state of the patient's health, rather than to any local cause,
perhaps, that the condition of the stump must be attributed.

The state of the patient after the operation can only be

explained by calling to mind the great nervous depression in-
duced by so long a period of suffering; the addition of the
shock of the operation, the loss of blood, the effects of
chloroform, the constant vomiting produced a degree of ex-
haustion and prostration from which she never rallied. Except
in cases after severe injury I have never seen a stump become
so rapidly gangrenous as in this case.

We must add a few remarks upon the disease itself. From
the first moment of the observation of the swelling by the
patient herself and its removal twenty-six months elapsed.
But as the growth gave no pain and was as large when she
broke the leg as it was when first observed, six months before,
we may assume that it had existed a few months before any
observation was taken of it. Probably, therefore, the age of
the growth was about two and a half years. This must be
considered as a very long period if the disease be regarded as
carcinoma. For generally that disease, when affecting a long
bone, grows rapidly and steadily.

Then the form of the hole in the anterior face of the tibia
was very singular, especially the thickness and regularity of its
bony border.

Lastly, the new growth itself, in what class must it be
placed? An examination of its elementary structures with the
aid of the microscope, before and after amputation, showed a
quantity of fibre-tissue, elongated cells, and nuclei. Floating
about in the field of the microscope were nucleated cells, some
with caudate ends, others without. Mr. Bankart made a
sketch of these elementary structures for me. There was not
any milky juice pervading the growth, and to the unassisted
eye it had a somewhat gelatinous texture. My own conviction
I admit to be in favour of placing this growth in the group of
fibro-plastic formations. A few of its elements may resemble
those to be found in true carcinomatous growths, but the
history of its development, its progress and external appear-
ances, especially its remarkable limitation to the single organ
first affected after the lapse of so many months and under
such peculiar circumstances, deter me from pronouncing the
disease to be carcinoma.

The following case is here introduced in order to record the

successful issue, thus far, of an amputation through the femur on account of disease, believed, at the time, to be carcinoma of the head of the tibia. The disease had been in progress one year when the operation was performed, and the first symptom, before any swelling was noticed, was violent pain. A very remarkable feature of this case is the fact that the patient was in the third month of pregnancy when the pain was first complained of. Whether the disease was really carcinoma or not, the result of the operation performed in this case may be regarded as an encouragement to pursue the same line of treatment. For the patient has certainly had freedom from pain for a period of seven years, even if we demur to stating that life has been prolonged for a similar period.

A married woman, in the thirty-third year of her age, was admitted into Esther Ward under my care, in December, 1856, on account of a swelling of the head of the right tibia.

She was born in the country, was formerly a domestic servant, had been married fourteen years, and given birth to eight children. Her facial aspect was anxious and careworn, but she said she had enjoyed good health. The constitutional powers were evidently greatly depressed by repeated parturition and lactation, poverty and suffering.

In May, or about six months before she entered the hospital, her attention was drawn to the middle of the right leg, a little below the knee, in consequence of suffering violent pain in that region. She was at that time in the third month of pregnancy. Two or three months afterwards, a swelling appeared which slowly increased, although it had not done so lately. About a month since, she gave birth to her last child, which she was suckling.

At the moment of admission into the hospital the internal tuberosity of the head of the right tibia appeared to be expanded; the inner flexor tendons were spread out over the swelling; the knee-joint was semiflexed, and could not be perfectly extended. When the muscles were paralysed by the administration of chloroform the tibia could be completely extended, but it was impossible to retain it in that position on account of the pain it caused. The growth had a broad base, it could not be moved upon the tibia in the slightest degree,

and it felt of·bony hardness. The use of leeches, ice, and evaporating lotions, did not afford any relief; but the application of warmth and moisture usually induced a diminution of pain. She quitted the hospital in January, 1857, and was again admitted in the following April.

The growth was larger, the knee more flexed, the pain rather less. The whole mass was more acuminated, the integuments over it were shining and slightly injected. She had weaned the infant, and her aspect was not quite so forlorn as before. The inguinal glands were healthy.

I now introduced a trocar and canula, in the hope that some fluid might escape, but only a little blood oozed out, and the canula seemed to be very firmly fixed, and did not move so freely as it usually does in softer growths. Still hoping that the disease might prove to be innocent, I suggested the necessity of amputation, after having exhausted all measures to afford relief. The patient consented, and the operation was performed, through the femur, in May, 1857.

A vertical section was made through the head of the tibia, which showed that its whole cancellous tissue was connected into a firm fibro-cartilaginous mass, which offered considerable resistance to the knife and to the pressure of the finger-nails. This new growth extended about two inches beyond the contour of the internal tuberosity of the head of the bone, and downwards in the shaft of the bone for about one inch. A turbid, although not milky, juice, could be expressed from the growth. Scarcely a trace of bony tissue could be recognised, the cancellated tissue, as well as the compact, being destroyed, and its site occupied by the new growth. The elements of the tumour, examined with the microscope, were nucleated cells, with fibre-tissue, similar in character to those found in carcinoma. The section was shown at a meeting of the Pathological Society, and a report of the specimen is published in the 'Transactions' (vol. viii, 1857, p. 388). Drawings Nos. 20[60], [61], and a preparation No. 1251[85], are to be seen in the museum.

The stump healed favorably, and she left the hospital in June. The most interesting and encouraging facts regarding this patient remain to be related. I have frequently seen her since she was last in the hospital, and during the time, a

period of now seven years, she has enjoyed average good health. The stump is quite healthy. She has given birth to several children, which, with the attendant circumstances, the exigences of a large family and struggles against poverty, have doubtless tended to keep her constitutional nutrition at the lowest standard.

The next case is related as typical of true carcinoma affecting the shaft of a long bone, and it is here introduced for the sake of comparison with the first case detailed in this paper. The facts to be specially noticed are—the youthfulness of the patient, her apparent good state of bodily health and development, the sudden pain experienced, the forerunner of all the after-mischief, the insidious progress of the disease in the first instance, and afterwards the rapidity of its development; its effect upon the bone, the surrounding parts, and yet the freedom of the lymphatic system from disease. In this case the disease was growing only about two and a half months, for that time only elapsed between the first complaint of pain and the operation, yet the mass of new tissue was enormously large, and the rapid increase in the size of the limb was almost observable from day to day.

A girl, in the eighteenth year of her age, was admitted into Martha Ward in July, 1862, where Mr. Couling wrote the following report of the case:—She was of fair complexion, light hair, gray eyes, remarkably well developed, and of most healthy aspect. Her nutrition seemed to be unexceptionable. She had always enjoyed good health, and had never had any illness until the commencement of the present one, for the treatment of which she was admitted. She was born at a village in Kent, the eldest of eight children, four of whom died infants; the remainder are very healthy; her father is very healthy, the mother rather delicate, and she has been generally well fed and taken care of. One night in June, 1862, she was prevented sleeping for some time, on account of severe pain just above the left knee. She had not injured the part, nor had she been exposed to cold, neither had she before felt any inconvenience therein. The following morning the lower part of the thigh was swollen, and in a few days the

swelling extended higher up, and the pain became so severe that she was unable to obtain any rest.   Six weeks after experiencing the first attack of pain she was admitted into the ward in this condition.   To all superficial examination she was in good health, although an expression of anxiety and suffering might be frequently noticed.   So many sleepless nights passed in agony interfered with the appetite, although she was not so much reduced as commonly happens under these circumstances.   The left thigh was much swelled, and in the inferior half the muscles and bone seemed to be consolidated and to form a firm solid mass.   The knee-joint was semiflexed, and any attempt to straighten it increased the pain.   At this moment we hoped that the disease might prove of an inflammatory origin, and accordingly measures were adopted to assuage the pain, encourage suppuration, and support the powers of the patient.   For three weeks our efforts to afford relief were unavailing ; but about that time a part of the tumour seemed rather softer than before, and an opening was made in the hope of giving exit to some fluid or pus.   But only blood flowed.   The nature of the disease was now, without much doubt, painfully manifested, but all hesitation upon the point was removed in a few days afterwards by finding the shaft of the femur broken at the junction of the middle and lower third.   In a day or two the disease increased rapidly, and there seemed to be no other alternative than amputation. The inguinal lymphatic glands were not affected.   Delay in the performance of the operation was occasioned by the parents refusing their consent, and it was not until they found that all kinds of treatment failed to relieve the sufferings of their child that that proceeding was adopted.   Amputation through the upper third of the femur was performed on September 2nd, the bone at the section appearing to be quite healthy.   Convalescence progressed slowly, but towards the middle of November she was able to sit up in bed.   About this time she seemed to take cold ; acute pneumonia supervened, and she died on the 29th of the month, and the fifty-seventh from the operation.   A post-mortem examination was strongly opposed.

The amputated limb showed that the disease which affected the femur was carcinoma.   It had commenced in the medullary

cavity of the shaft, destroying the compact texture of the bone, and then formed a large mass of new growth around it and between the muscles.   A drawing (No. 9^{10}) was made of the tumour by Mr. Hurst, and a preparation (No. 1161^{10}) is preserved in the museum.

DESCRIPTION OF PLATE

Illustrating Mr. Birkett's Case of a new Growth in the Tibia.

Fig. I.   Is an anterior view of the tibia, showing the new growth occupying a circumscribed hollow space in the shaft.

Fig. II.   Represents the posterior surface of the tibia, with the wall bulging out from the growth of the tumour within.

Fig. III.   Is a lateral view of the tibia, by which the amount of projection on the anterior and posterior surfaces is seen.

W.Hurst, ad nat delin.

M &N Hanhart, Imp.t

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I
Anterior.

II
Posterior.

III
Lateral.
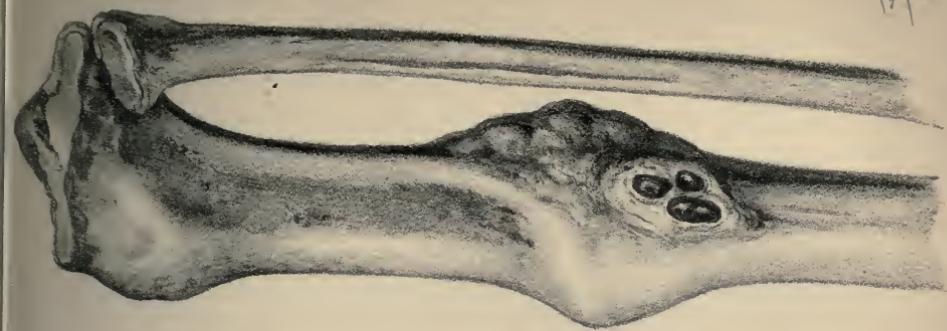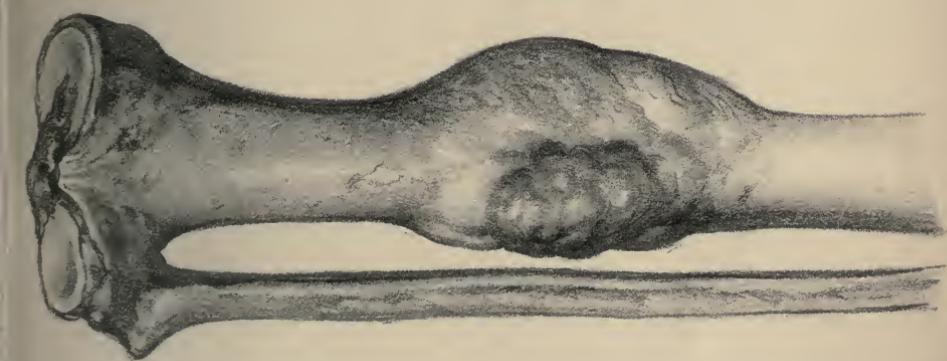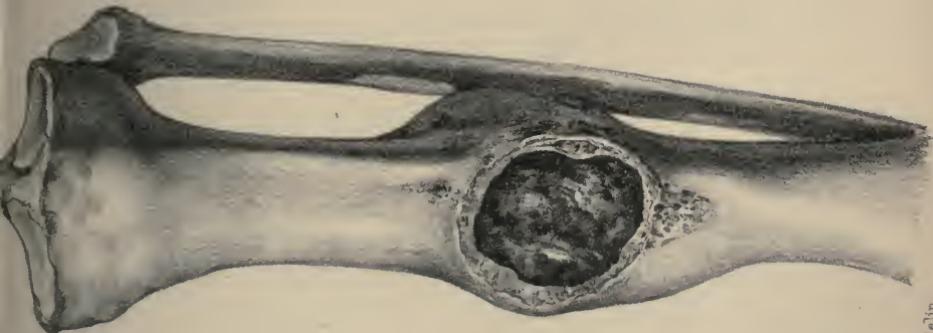
CASES AND OBSERVATIONS IN MEDICAL JURISPRUDENCE.

By ALFRED S. TAYLOR, M.D., F.R.S.

1. *Chronic Poisoning by Mercury through the Skin and Lungs. Death after four years.*

THE notes of the following singular case of chronic poisoning by mercury were taken by Mr. Herbert Spurgin, clinical clerk.

Richard B—, æt. 32, a furrier, living in Loman Street, Southwark, was admitted December 10th, 1863, under the care of Dr. Rees. He is a well-made man, not at all emaciated, married, with two children; was formerly footman to a gentleman living at Clapham, and always enjoyed excellent health. Four years ago he first began his present occupation, which is to pack up the skins of animals (rats, neuters, &c.) that have been washed with an acid solution of mercury and afterwards dried, a process which is supposed to soften the skins and thereby render them more suitable to be afterwards made up into wide-awake hats. (He has only been employed in *packing* the skins, not being occupied in that part of the process which consists in drying the skins, and thus evolving fumes of mercury.) For the first three years, he did nor suffer much inconvenience from his occupation beyond feeling some general weakness. About twelve months ago he found he could not hold his hand steady enough to shave himself, and he soon after lost complete control over his limbs, and his friends told him he was nervous. He went as an

out-patient to the Westminster Hospital, and was advised to give up his occupation, an advice, however, which he did not follow. By degrees he lost voluntary control over his muscles when standing or moving about, and three or four months back, first began to have slight twitchings when in bed. Says he was salivated for about three months soon after he began this occupation; but that his gums have not been tender, nor has he had any metallic taste about his mouth. He gave up work a month ago, finding that he was getting worse, and attended at Guy's Hospital as out-patient for a fortnight, and afterwards was admitted as an in-patient. On admission he could manage to walk tolerably well with a little assistance ; but when standing could not control his limbs, which trembled considerably, and even when in bed they had the same constant tremulous motion. He complains of feeling very much exhausted, and has had no sleep for several nights ; also complains of headache. His tongue is furred, bowels costive, skin perspires profusely. The heart-sounds cannot be distinctly heard in consequence of the continuous spasmodic movements of the muscles of his chest. Urine high coloured, sp. gr. 1025, contains no albumen or sugar. Passes about the normal quantity during the twenty-four hours. Ordered Ammon. Bicarb. gr. v ex decocto Scoparii t. d., and what diet he can take best.

11th.—Had a bad night, not being able to sleep at all. Much the same in other respects ; his limbs have constant spasmodic movements, very much resembling those of chorea. The spasms increased in violence towards evening, when he was ordered Opii gr. iss.

12th.—Passed a very bad night, having had no sleep ; feels sore all over his limbs where they come in contact with the bed ; they look quite red and inflamed. Ordered Potassii Iodidi gr. iij, Tinct. Opii ℳx, ex mist. Camph., ter die. 9 p.m.—Very restless ; gets out of bed, and seems quite delirious. Had not passed water since the morning. A catheter was introduced, and about a quart of high-coloured urine drawn off. Ordered Sp. Æther. Sulph. co. ʒj, Liq. Morphiæ ʒss, ex Aquâ, statim, et rep. post horas quatuor si opus sit. Seemed rather quieter after his bladder was emptied. To take brandy ℥vj.

13th.—Took two draughts in addition to his mixture, but

only slept about an hour. The spasmodic movements continued unabated. A catheter has been passed, and his bladder has been emptied this morning. 8 p.m.—Has passed his urine in bed. Very restless.

14th.—Had no sleep last night. Continues delirious. Constantly throws his arms about. 10 p.m.—Was exceedingly restless; and the spasms continuing very violent, chloroform was administered, under the influence of which he was kept about twenty minutes, but with no further benefit. Bowels have not been relieved. Ordered MM. c. MS. ʒj, 6tis horis; Opii gr. j, 6tis horis. 8 p.m.—Took one pill, but will not take his mixture. When given anything to drink, retains it in his mouth a few minutes, then spits it over any one near him. Pupils contracted.

15th.—Urine passed involuntarily. Bowels not moved. Movements of limbs continue much the same. Has had no rest. Ordered Liq. Opii Sed. ʒss, ex Aquæ ʒiij, pro injection. h. s.

16th.—Slept about an hour during the night; seems more exhausted this morning. Skin continues quite wet with perspiration. Not quite so restless as yesterday. Rep. inject. h. s.

17th.—Slept tolerably well last night; much quieter this morning, there being only slight spasm. Liq. Opii Sed. ♏xx h. s. s.

18th.—Is now quite quiet if not disturbed. Took his draught last night. Cannot protrude his tongue very well. Still passes his urine involuntarily. Ordered enema communis; rep. haust. Opii nocte.

19th.—Pulse 126. Quite still; answers when spoken to, although it takes some time to make him understand what is said to him; slept well; takes very little nourishment; bowels not relieved.

20th.—Had another enema, and his bowels have been relieved. Pulse 120. Cannot be induced to take much nourishment, and seems much weaker.

24th.—From the last date he has been getting weaker, and would take scarcely any food. Has had no return of spasm. He fell into a state of unconsciousness, and the action of the heart became more and more feeble, until death took place on the 25th, the fifteenth day after his admission.

The *post-mortem examination* showed the body to be well nourished, not at all wasted, and the muscles of a normal red colour. The brain and spinal cord were carefully examined, and appeared to be quite healthy. The lungs, heart, liver, spleen, and kidneys, presented no morbid appearance, so that, unless it had been for the history of mercurial poisoning, it would have been difficult to assign the cause of death.

Chemical analysis.—Soon after the admission of this patient his urine was submitted to a chemical examination. I found that it had the usual characters of healthy urine, excepting in the fact that the lithates were rather more abundant. Twelve ounces were evaporated, and the residue carefully tested, both by copper and by a gold and zinc pile, for the presence of mercury, but not the slightest trace of the metal could be detected. It was obvious, therefore, that if mercury was in the act of being eliminated at all by the kidneys, it could only be in infinitesimal quantity.

After death the brain, liver, and kidney, were examined. Six ounces of each organ were dried, and one half of the dried residue was digested in one part of pure hydrochloric acid and four parts of water until the organic substance was entirely broken up, and a thin liquid was obtained in each case. This was concentrated by evaporation, and, while slightly warm, a pile formed of a slip of thin gold-foil, twisted round a slip of zinc-foil, was suspended in each of the acid mixtures properly diluted, and allowed to remain immersed for twenty-four hours. In the acid liquid from the kidney, the gold had by this time acquired a slight white tarnish, while the zinc had become dissolved. The gold-foil was washed, dried, and heated in a reduction-tube, and a well-marked sublimate of globules of mercury was obtained. These were visible by the aid of a lens, and still more perfectly under a low power of the microscope. The gold which was suspended in the acid liquids of the brain and liver received no deposits, and, on being heated, it yielded no sublimate of mercury. About a quarter of a square inch of fine copper gauze was now introduced into the acid liquids obtained from the three organs; the liquids were gently heated, and the copper allowed to remain in contact forty-eight hours. At the end of this time, the copper from the liquid of the kidney

had acquired a dark-gray tarnish; that from the liver was of a dull, grayish-white appearance, and the copper from the brain similar, but with less metallic deposit. These three portions of copper, washed, dried, and heated, yielded sublimates which were proved by a microscopic examination, to consist of globules of metallic mercury. The largest sublimate was obtained from the kidney. The average size of the globules separated from this organ was the 1-1750th of an inch, and those from the liver and brain had a diameter of about the 1-2600th of an inch. It was thus proved that mercury had been absorbed and deposited in the organs of this man; that the metal was obtainable by ordinary chemical processes from a quantity equivalent to three ounces of each organ; but that, weight for weight, the kidney yielded a larger amount than the brain and the liver. The results also showed that, in reference to the tissues, mercury was more completely separated by the chemical action of copper, than by the galvanic process with gold and zinc.

Dr. Whitley ascertained, by inquiry at the factory in which this man had worked, that it was part of the process of preparing furs, to use a solution of nitrate of mercury for brushing over the fur of the rabbit or musk-rat. For this purpose, five pounds of mercury were dissolved in twenty-five pounds of nitric acid, and the mixture was heated until all the metal was dissolved, the fumes being carefully conducted off. This strong solution was diluted with about eleven parts of water for use; the fur was impregnated with the liquid, and the skins were laid on racks to dry during the night. The object of using this liquid is to improve the fur and preserve it from the depredations of insects. In the morning the fur was evenly removed from the skin in one mass by machinery. The skins were cut up and employed in the manufacture of glue. The fur was collected by the hand and packed in paper-bags. The man whose case is above related was one of the packers, and was thus in the habit of daily handling fur on which nitrate of mercury was necessarily deposited by evaporation. Dr. Whitley handed to me a portion of the fur thus prepared. A few fibres of it were sufficient to give a rather copious deposit of metallic mercury on copper, when it was warmed with water acidulated with hydro-

chloric acid.   Here, then, was a sufficient source of this metal to bring about chronic poisoning.   Although the art of packing would lead to the diffusion of a fine mercurial dust, it is probable that the mercury penetrated into the system through the skin of the hands, as well as by the lining membrane of the throat, mouth, and lungs.

This case appears to indicate a remarkable idosyncrasy to the poisonous effects of mercury, and at the same time an immunity from any serious effects for an unusually long period.   It was ascertained that the deceased had been working as a packer for four years, and for three years, according to his own account, he did not suffer any injurious symptoms, if we except some salivation for the first three months, and a feeling of general weakness.   It was, however, obvious that a year before his admission into the hospital, the poison had affected the motor nerves, and that he was gradually losing muscular power.   Had he withdrawn from the work at this date, it is probable he would have recovered from the effects, but he declined to follow the advice which was given to him.   When I saw him, shortly after his admission, he was in incessant motion, either with his head, trunk, or limbs.   These movements were quite involuntary like those of chorea, and so frequent and violent as rapidly to exhaust him and prevent him from obtaining rest at night.   There was no salivation, no mercurial fetor in the breath, and no blue line at the junction of the gums with the teeth.   The case was unlike any known disease excepting chorea, and it was unlike any of the forms of chronic poisoning by mercury which have been hitherto described by toxicologists.   Yet the nature of his occupation with the discovery of mercury in the brain, liver, and kidney, can leave no reasonable doubt that this man died from the effects of the metal, received partly by contact through the skin and partly through the lungs.

Dr. Whitley's inquiries elicited the information that others engaged in work of a similar kind had not suffered in health, and that no case of poisoning, chronic or acute, had previously occurred among the workpeople of the establishment, Admitting this statement to be perfectly correct, it is more surprising in a physiological point of view that other workmen could handle with impunity furs containing dry nitrate of

mercury for many years, than that one man should have suf-
fered and died from the effects.

2. *Absorption and Diffusion of Mercury when taken in Medicinal Doses.*

The case above related does not show that mercury was slowly
absorbed, but rather that the metal was slow in manifesting
any injurious effects upon the system.

The following case, which occurred in May 1864, demon-
strates that small medicinal doses of mercury, even in the com-
paratively insoluble form of calomel, are rapidly absorbed and
diffused through the body. A child æt. 2½ years died after an
illness of twenty-two hours. Poisoning was suspected, and at
first it was supposed that the child had died from the effects of
arsenic. Portions of the viscera with some of the blood, were
sent to the Chemical laboratory for analysis. No arsenic was
detected in any of the parts examined, but mercury was found
in a green-coloured evacuation passed shortly before death.
This led to a further examination of the viscera, and in four
ounces of the liver, mercury was detected by the process with
copper gauze described in the preceding paper. The red
colour of the copper was obscured by the rapid deposit of
white metal, and, on applying heat to it in a tube, a sub-
limate of mercury in globules was obtained. The heart was
examined by a similar process, but gave no trace of the metal,
nor could any be detected in the dried residue of six ounces of
blood.

The history of the case was this :—The child had had no
mercurial medicine until *sixteen hours* before its death. Two
grains of calomel, with one of aromatic confection, were then
given to it. A large proportion of this dose had been carried
through the bowels with the evacuation, but a portion had
evidently been absorbed and deposited in the liver. Some ex-
perts have advanced the theory that, if metallic poison is found
deposited in one organ, it should be found in the blood as well
as in all other organs. The actual necessity for this uniform
and universal diffusion and deposition of poisons is not appa-

rent. It begins and ends with theory, for in practice we find great differences, not only in the same human body, but among different bodies. The above is one among many cases illustrative of this proposition. The cause of death gave rise to no contentions among medical witnesses. The mercury had been *bonâ fide* prescribed by a medical practitioner, and had had no share in the death of the deceased. The case shows that in sixteen hours the mercury derived from an insoluble compound like calomel may be found deposited in the liver.

3. *Case of Poisoning by Turpeth Mineral.   Early occurrence of intense salivation.   Death in eleven days from forty grains.*

The following case was communicated to me by Mr. Snoad, of Yoxall. It is a protracted case of a poisoning by turpeth mineral taken by mistake for æthiops mineral. The symptoms of the patient were accurately noted daily by Mr. Snoad:

J. W—, æt. 27, sent for me on the 8th of January, 1862, at 10 a.m. I found him sitting on the privy, suffering from violent purging and vomiting. He looked pale and anxious; pulse slow and small, skin cold and clammy; was told he had taken some yellow powder in treacle, about ten minutes before, on an empty stomach, before breakfast. I ordered him to drink freely of milk, to be brought in-doors and placed on the sofa before the fire, with warm applications to the feet, and to be wrapped in warm blankets, then to drink white of eggs beaten up. He complained of soreness in his mouth and throat, and the saliva continually ran from his mouth; continued to vomit the milk and white of eggs mixed and coloured with yellow powder; passed rice-water-looking motions, some yellow, like the vomit. 10.30 a.m.—Is warmer and inclined to sleep; is disturbed with the vomiting of mucus and blood in small quantities; gave him an ounce of a mixture containing mucilage, acacia, catechu, and chlorate of potass, which was retained ten minutes. Complains of pain in epigastrium and abdomen; gave him ℥ss Ol. Ricini. 1.30 p.m.—Vomiting and purging of mucus continues, but not so frequent; is restless. 4 p.m.— Expresses himself better, saliva flows copiously; urine scanty

and scalding, but clear. 10 p.m.——Has dozed at times, awakes frightened, vomits and strains every ten minutes; saliva flows constantly; has taken frequently milk thickened with flour and oswego. Pulse 90, tremulous; has used garg. Alum. frequently.

January 9th, 10 a.m.——Has had some sleep during the night; looks anxious; lips, gums, fauces, and tongue swollen; mercurial fetor of the breath. Pulse 95, hard; has taken milk and water thickened and castor oil this morning; vomits soon after taking anything; has had a sinapism over epigastric region; fæces more natural and bilious. 10 p.m.——Feels very low and restless. Pulse 90, tremulous; has taken three doses of effervescing mixture, and retained some, also thickened milk, eggs, and brandy. Bowels have acted four times during the day slightly; has used gallic acid gargle.

10th, 10 a.m.——Has had a restless night, with dreams and delirium. Pulse 85, regular; has taken Ol. Ricini; has passed brown loose motions; retains milk and beef tea; mercurial fetor stronger; tongue moist, swollen; gums and palate dark-bluish coloured; anus sore; passed urine in small quantity. 10 p.m.——Has taken effervescing mixture through the day, and beef tea, rice, milk thickened with flour, eggs and brandy beaten up; feels uneasy in inside. Pulse 90, softer; to take opium h. s.

11th, 10 a.m.——Has dozed at times in the night, been restless and uneasy in his inside; lips, gums, tongue, and throat, more swollen. Pulse 90; passed a loose motion, with portions of undigested rice and flour; sickness abated. 10 p.m.——Pain in the inside; has had hot applications and sinapisms externally; has retained nourishment and medicines through the day, and used the gargle frequently; looks pale and anxious.

12th, 10 a.m.——Has had a restless night; taken castor oil early; bowels have not acted; breathing is oppressed. Pulse 90; flatulence, causing pain; enema with gruel and castor oil given. 2 p.m.——Bowels have acted; breathing relieved. 10 p.m.——Appears more cheerful; has taken two doses of Chlor. Potas. mixture and used garg. Potas. Chlor. Mouth very sore; to take opium h. s.

13th, 10 a.m.——Has slept at intervals; awakes frightened. Pulse 86; tongue furred, swollen, but moist; bowels acted twice; motions brown and loose. 10 p.m.——Much the same;

bowels acted twice; tenderness on pressing the abdomen; flatus; urine clear, scanty; saliva profuse.

14th, 10 a.m.—Has had a restless night. Pulse 90; looks more anxious; lips, livid; headache; pain in abdomen; bowels have not acted; enema repeated, and turpentine fomentations on the abdomen. 6 p.m.—Feels better; bowels have acted; motions of a brown colour. Pulse 86; has taken broth and thickened milk; slept at intervals. 12 p.m.— Feels inclined to sleep; retained nourishment. Pulse 80; suppository of opium given.

15th, 10 a.m.—Has slept at intervals; rather delirious in the night; fæces brown. Pulse 84. 2 p.m.—Has taken nourishment, is sensible, and expresses himself better. 6 p.m. —Is restless, complains of pain in abdomen and stomach; headache; enema of beef tea; milk, eggs, and brandy given; unable to swallow much; refuses to take medicine. 12 p.m.— Bowels have acted. Pulse 80, soft; headache; has taken thickened milk; lips, gums, palate, and fauces, look dry and black; enema repeated.

16th, 10 a.m.—Has slept at times, dreamed and started. Pulse 84; skin dry; headache; tongue covered with dry, black fur. 2 p.m.—Death-symptoms commenced; rattling in the throat; look wild and anxious; tongue, palate, and lips dry. Pulse 90; abdominal respiration. 8 p.m.—Weaker. Pulse 96; has taken a little brandy and tea; refuses to take broths and thickened milk; has headache and pain in the right side. 12 p.m.—Has dozed at times. Pulse 100; death-rattles louder.

17th, 10 a.m.—Continues to doze. Pulse 110, weaker; is sensible; has taken a little brandy and water. 3 p.m.— Strength declining; voice weaker; breathing more oppressed. Pulse 120. 12 p.m.—Weaker. Pulse 125; swallows small quantities of brandy and water.

18th, 3 a.m.—Weaker. Pulse 130; tremulous and irregular; passes fæces and a small quantity of urine involuntarily; is sensible, and knows his friends. 8.30 a.m.—He died quietly without convulsions.

Post-mortem Appearances.

Head.—Brain was slightly congested; dura mater and pia mater adherent at the upper surface by two small fibrinous spots, the result of old inflammation. Inner surface of mouth, lips, gums, palate, and fauces covered with black sloughs on their mucous membrane. The parotid and submaxillary glands were enlarged.

Chest.—Old-standing pleuritic adhesions completely around the right lung. Left lung and the heart healthy.

Abdomen.—Mucous membrane throughout the intestinal canal softened and easily torn, with dark-coloured patches at intervals. Stomach towards the pyloric opening and lower surface congested and softened, with inflamed patches on other parts. Glands of the stomach and intestines unnaturally large. Liver in some parts congested. Kidneys much enlarged, one weighed eight ounces. Bladder full of urine, its membrane was slightly congested.

The druggist who made this serious mistake was tried for manslaughter at the Stafford Lent Assizes for 1862; but the jury considered that there had been no culpable negligence, and the prisoner was acquitted. The nature of the poison was so conclusively established that a minute chemical analysis was not considered necessary. Mr. Snoad detected mercury by Reinsch's process in a small portion of the liver.

4. *Case of Poisoning by Corrosive Sublimate. Death in seven days. No Salivation. Suppression of urine.*

The Notes to this Case were taken by Mr. Pye Smith.

W. P——, æt. 26, a brass-polisher, living in Rotherhithe, having been for some time in a depressed state of mind and twice attempted suicide, swallowed, at six o'clock on the morning of the 16th of October, 1861, a solution of corrosive sublimate in vinegar. It appears that his mother had bought three-pennyworth of the salt in powder, "about half a thimbleful," and had dissolved this in a wineglassful of vinegar for

use in their work. Of this the man drank half, so that the amount of poison taken was probably from five to ten grains.

16th.—Immediately after swallowing the liquid, he felt a burning sensation in the throat, and vomited freely. Assistance was procured, and he was taken to the hospital at 7 a.m., and admitted at once into Accident Ward, under Mr. Birkett's care. He was then anxious and depressed, and suffered from nausea and shivering. Ordered Zinci Sulph. Ʒj ad vomitum. 8 a.m.—Two hours after taking the poison, he was found suffering great pain, referred to the pit of the stomach, and also from tenesmus. He has passed bloody stools, with abundance of mucus since admission, but no urine. The stomach-pump was now used with effect, and milk and eggs ordered every three hours. During the day the patient brought up a thick, yellow, frothy matter, tinged with blood, in small quantity. He passed little but blood and mucus per anum. 12 p.m.—Restless, but does not complain of pain. No water has been passed since admission.

17th, 10 a.m.—Has not slept during the night more than five minutes at a time. Face pale and anxious. Upper lip swollen. Mucous membrane of the tongue white. There is no salivation, but he complains of soreness of the mouth, and cannot open it wide. There is also tenderness on pressure at the epigastrium. Pulse 70. Respiration normal. Back and feet cold. At 9 a.m. he passed a copious stool, and another shortly afterwards, both without blood. Vomited once. 12 p.m.—There has been nothing but bloody mucus passed per anum. Vomiting of a slate-coloured semifluid substance. No urine has been passed.

18th.—Has had a bad night, and is now cold and depressed. The urine was drawn off this morning by a catheter. During the day the patient passed frequent stools, consisting chiefly of mucus and coagula. The soreness of the mouth he complained of, is now gone. There was no mercurial fetor. Pulse 72, feeble. Ordered Tr. Opii ♏ xxx statim sum.

19th.—Slept much better than before, for three or four hours together, in which time he passed some urine naturally for the first time since taking the poison. He vomited once some greenish biliary liquid, with flakes of white of egg.

There is now no tenderness of the abdomen. Pulse and tongue good.

20th.— Slept but little; three or four motions, which were more natural; complains of soreness of the throat and inability to swallow; tenderness in the umbilical region on pressure; face somewhat swollen.

21st, 10 a.m.—The patient is much worse to-day. Blanched, and greatly depressed. Tongue and fauces sore, and the lips swollen and encrusted with a dry secretion. He was delirious during the night. He now complains of burning thirst, and spits up thick pellets of mucus mixed with blood. Ordered Tr. Opii ♏ xxx statim sum.

In the afternoon he could scarcely open his mouth to answer questions when roused from the half-stupor in which he lay. Face blanched, drawn, and singularly fixed in expression. Pointed to his mouth, which was evidently very sore. Breathing laboured. Pulse 90.

22nd.—The patient lay during the night in this unconscious condition, the motions passing involuntarily. They were tolerably healthy, though loose, containing little blood. The suppression of urine continued. At six o'clock on the morning of the 22nd he called out loudly, and suddenly died without any convulsion.

Inspection, eight and a half hours after death.—The face presented the fixed expression it had had for the last two days. The rigor mortis was remarkably strong.

The lungs were extensively affected with lobular pneumonia. The œsophagus was marked by injected longitudinal streaks, and contained shreds of organized lymph. The mucous membrane of the stomach was throughout minutely injected of a bright rose colour. It was much reddened, but not corroded or destroyed. The duodenum, jejunum, and most of the ileum, were not affected, but at a sudden bend of the latter part of the intestine there was a space where the mucous membrane was deeply injected. The cæcum appeared to have suffered but to a slight extent, the increased vascularity of the mucous membrane being continued directly from the ileum to the ascending colon. In this last part of the bowel, there was very deep injection of the mucous membrane throughout its whole cir-

cumfereuce with small depressed ulcers scattered here and there.
The coats of the rectum were throughout stained of a deep-red
colour, from extravasated blood, and this appearace was most
marked in the " longitudinal folds" of the mucous membrane.
In the dilatation close to the anus there were three large
oblong patches of effused lymph.   The kidneys were large and
coarse in texture, but otherwise normal.   The mucous mem-
brane of the bladder was marked throughout by ecchymosis.
The spleen was very small, but healthy.   The heart, brain, and
other viscera, were perfectly healthy.

Chemical analysis.—The mucous membrane of the stomach
presented an appearance more resembling that of arsenic than
the effects of corrosive sublimate. There was, however, no
arsenic present.   One half of the stomach, with the adhering
mucus, treated with hydrochloric acid and water, and tested
by copper-gauze, as described in a preceding case, yielded a
deposit which was proved, by the sublimate obtained, to consist
entirely of metallic mercury.   A portion of the liver, amounting
to seven ounces, was dried, and distilled with four ounces of
strong hydrochloric acid.   The object of this proceeding was
to determine whether there was any absorbed arsenic.   The
acid distillate was tested with pure zinc, and the hydrogen
obtained from it was found to be entirely free from arsenic.
The residue left in the retort was diluted, gently heated, and
then tested with a pile of gold and zinc-foil.   In twenty-four
hours there was a deposit on the gold, from which globules of
mercury were obtained by sublimation, but in small quantity.
It may be remarked that no mercury was present in the acid
distillate.   The quantity of mercury obtained from the liver
was very small.

The residue of the poisonous mixture which the deceased
swallowed contained corrosive sublimate in solution.   The mat-
ters which he had vomited in the early stage of poisoning had
been thrown away, so that no examination of them could be
made.

The case is worthy of notice on one or two points.   There
was soreness of the mouth from the local action of the poison,
but no salivation.   There was absence of mercurial fetor, and
suppression of urine.   The irritant and not the corrosive action

of the poison was manifested on the alimentary canal. The mucous membrane, from the stomach to the rectum, presented, more or less, marks of irritation and inflammation. The man complained during life of pain in the region of the cæcum and ascending colon; but the cæcum did not present that degree of inflammation which has been found in other cases of poisoning by this substance.

The chemical analysis showed that the poison, whether free or absorbed, had been nearly eliminated or discharged from the body. The deceased had lived seven days, and had been actively treated; hence one half of the stomach gave only traces of mercury, probably derived from the coats. As to the absorbed poison, seven ounces of the liver gave mere traces, showing that the metal was rapidly leaving the system. Had the man lived another week, probably none would have been found.

5. *Poisoning by Aconite.*

Mr. Puckle consulted me in November, 1863, in reference to the case of William Hunt, who destroyed himself by swallowing a quantity of the tincture of aconite. He brought the stomach to the Chemical laboratory, and it was there examined as to post-mortem appearances, and for the detection of the poison. Mr. Puckle has furnished me with the following notes of the case:

On the 9th November, 1863, at a few minutes past 11 p.m., I was sent for to the Camberwell Police Station to see Samuel William Hunt, æt. 42. I went directly, taking with me Ʒij of sulphate of zinc, and was with him in less than five minutes. I learnt that he must have taken poison about ten minutes or a quarter after 10 p.m., when the police knocked at his door. I afterwards ascertained that, after knocking several times, the police were admitted by Hunt; they went up together into the bedroom, when Hunt sat down and retched immediately, vomiting into the chamber-utensil and on the floor. He then dressed himself, and accompanied the police to the station (conversing freely), a distance of about

250 yards.   On his arrival I was immediately sent for; I found him sitting in a chair, retching violently in a spasmodic manner; he at once recognized me, remarking that I had attended his wife in her confinement.   His countenance was pallid, skin cold and clammy, pulse small and hardly perceptible, and the action of the heart exceedingly feeble.   The eyes presented a remarkable appearance, the pupils being very much dilated.

The breathing was quiet and regular between the fits of retching, which were violent.   On questioning him as to what he had taken, he would not at that time admit that he had had anything but gin.   I immediately administered Əj of sulphate of zinc in warm water; he refused to take it, but on making him open his mouth he filled it, but spat it out, jerking the rest on the floor.   I gave him another Əj, taking care to make him swallow it; he appeared to vomit the whole almost immediately.   He then exclaimed, "Oh my heart!" saying he had heart-disease.   I then had him raised up, to see if he could stand or walk; he staggered across the room, nearly falling against the wall, apparently without the power of raising his arms.   He was then again placed in a chair, remaining perfectly conscious; he shortly afterwards said, "I lost my eyesight just now, but now I can see quite plainly."   He became sleepy, and seemed to doze for a few seconds, but roused up almost directly, saying he had had such delightful dreams.   At this time his eyes were fixed, and presented a most brilliant sparkling appearance; the pupils were extremely dilated.   He asked for writing materials, and wrote a few lines, but was unable to finish.   He became suddenly worse a quarter of an hour before his death, losing all power and sensation in his limbs, the sharpest pinches producing no impression, although cold water dashed on his face caused a sharp shriek; the pulse was imperceptible; there were no convulsions, but complete relaxation of the limbs at death, which appeared to arise from syncope, at five minutes before twelve o'clock, an hour and three quarters after taking the poison.

On going to Hunt's house I found in the bedroom a recently emptied tumbler, which had evidently contained tincture of aconite and water.   I also found an ounce bottle, uncorked, lying just inside a cupboard by his bedside, and a

saturated cork fitting the bottle lying in the room ; there were two drops left in the bottle of a sherry-coloured liquid ; both the bottle and the cork showed the presence of aconite,—when applied to the tongue, they produced numbness and tingling lasting for two hours. On comparison with the pharmaco-pœal tincture, that taken by Hunt was evidently much the strongest.

Post-mortem Examination, forty-two hours after death.

External appearances.—Extreme rigidity of the muscles ; erection of the penis and escape of seminal fluid ; there was a hydrocele of the right testicle.

Internal examination.—The vessels on the surface of the brain were turgid ; the substance of the brain was firm and healthy ; the ventricles contained but little fluid ; there was no effusion at the base of the brain.

Chest.—Heart perfectly healthy, right side greatly dis-tended with dark fluid blood, left side contracted and quite empty. Lungs healthy, but congested posteriorly from gra-vitation.

Abdomen.—All the organs quite healthy, except the stomach and duodenum, the internal surface of the latter having a reddish appearance, and being minutely injected. On opening the stomach it presented the following appearances :—great capillary congestion at the larger end, that portion being of a bright-red colour ; strong marks of irritation, with softening and separation of part of the mucous lining ; the whole of the membrane in a highly corrugated condition.

Remarks.—Ammonia and four ounces of brandy were admi-nistered by means of the stomach-pump shortly before death. Contents of the stomach about seven ounces, containing blood and mucus.

[The appearance of the mucous membrane of the stomach was so remarkable, and so much resembled the effects of an irritant poison, that I caused a drawing of it to be made by Mr. Hurst. This is now in the Museum collection.

In reference to the analysis, it may be observed that the contents of the stomach were simply exhausted by alcohol, and the extract thus obtained produced the peculiar numbing sen-

sation of the lip which is characteristic of this poison.   Circum-
stances did not permit of the performance of any experiments
on animals.   The cause of death was obvious from the liquid
which remained in the bottle found in the house.—A. S. T.]

6. *Poisoning by Ammonia in Compound Camphor Liniment.*

Compound Camphor liniment consists of one fourth of strong
solution of ammonia with three fourths of rectified spirit, the
mixture holding dissolved a certain proportion of camphor.   Its
poisonous properties are those of an irritant ; they are due to
the ammonia.   In November, 1858, a lunatic swallowed two
fluid ounces of this liquid, and recovered in four days.   For
the particulars of the following fatal case I am indebted to
Mr. Gill, now a pupil at Guy's Hospital.

This was the case of an infant only four and a half days old
It occurred in September, 1863.   Mr. Gill saw the infant
about half an hour after the liquid had been taken ; it was
then screaming in a suppressed manner, as if the act increased
the pain ; the hands were tightly clenched ; the skin was pale
and covered with a cold perspiration.   The mucous membrane
of the lips was blistered, and that of the mouth and tongue was
white.   A yellowish froth escaped from the mouth and nos-
trils ; breathing was painful, and the pulse imperceptible.   In
about two hours the infant appeared better; but at intervals it
suddenly started and screamed, as if from sudden pain.   In six
hours it continued much in the same state, and swallowing was
painful.   In seventeen hours the skin was moist and cool ; it
had had a natural motion, and had been in a drowsy state
during the night.   After twenty-four hours the infant was
much weaker ; the limbs were cold, and the breathing was
feebly performed. It became drowsy, and died thirty-two hours
after taking the poison.   There was an inquest, but no
inspection.   A question of importance arose in reference to
this case.   Either the mother or a child two years of age must
have given the poison to deceased.   The mother stated that
this child was playing with the bottle of embrocation on the
bed on which her infant was lying.   She left the room for a

short time, and on her return she gave the infant a teaspoonful of food which she had previously prepared for it. She was sure the infant swallowed part of this food ; but as soon as the food was taken it screamed violently and struggled for its breath, and then she perceived the food to smell strongly of the embrocation. As, from the nature of this irritant compound, the symptoms could not be suspended, it is clear that the mother, either consciously or unconsciously, gave the poison to her infant. On the latter supposition it must have been placed in the food, which was on a chair near to the bed, by the child of two years, during her absence ; but in this case it is remarkable that she did not perceive the odour until after she had poured the liquid into the mouth of the infant. The quantity swallowed was unknown.

7. *Poisoning by Alcohol. Fatal effects of Brandy on a Child.*

Of all the liquids operating as narcotics or affecting the brain, this has the most powerful local action on the stomach. A case of alcoholic poisoning of a child æt. 7, referred to me by Mr. Jackaman, Coroner for Ipswich, in July, 1863, will serve to show the correctness of this remark. The girl was found at four o'clock in the morning, lying perfectly insensible on the floor. She had had access to some brandy, which she had swallowed from a quartern measure found near her, quite empty. She had spoken to her mother only ten minutes before, so that the symptoms must have come on very rapidly. She was seen by Mr. Adams four hours afterwards. She was then quite insensible, in a state of profound coma, the skin cold and covered with a clammy perspiration. There had been slight vomiting. The child died in twelve hours, without recovering consciousness from the time at which she was first found. On *inspection* there was congestion of the brain and its membranes ; the heart and lungs were quite healthy. The mucous membrane of the stomach presented patches of intense redness, and in some places it was thickened and softened ; portions of it were detached and hanging loosely in the stomach, and there were patches of black extravasation about it, evidently from altered blood. It contained a greenish-

coloured liquid, but there was no smell of brandy in it, neither was this perceptible in the breath of the child four hours after the alcoholic liquid had been taken. At first it was suspected that arsenic had been administered; but the symptoms were not those of arsenical poisoning, and neither arsenic nor any other metallic irritant was present in the contents of the stomach;—but slight traces of the vapour of alcohol were detected by distillation. The vapour readily reduced chromic acid to green oxide of chromium.*

8. *Poisoning by Nitrobenzole.*

This liquid, which is largely employed as a substitute for the essential oil of bitter almonds in perfumery and confectionery, has now taken its place among narcotic poisons. In the second edition of my work on Poisons (1859) some experiments were quoted from the 'Lancet' (Jan. 10, 1857, p. 46), showing that one drachm of nitrobenzole killed a rabbit almost instantaneously, and half a drachm mixed with two drachms of water rendered a cat insensible for several minutes, a slimy mucus flowing from its mouth for several hours afterwards. The animal refused all food, and died in twenty-four hours. ('On Poisons,' 1859, p. 701.) In 1859 the late Professor Casper, of Berlin, published an account of this liquid under the name of "A New Poison"—" Ein neues Gift.," ('Vierteljahrschrift,' B. xvi, p. 1). Its effects on a rabbit and a dog are here described. Two drachms of it were given to a rabbit without any symptoms being produced; two drachms were then given to the animal at intervals of ten minutes or a quarter of an hour, until the rabbit had taken one ounce. In a minute and a half after the last dose, the animal fell suddenly on its left side. The pupils were dilated, while the limbs and tail were strongly convulsed. The animal died in a minute. The dose was probably unnecessarily large, but the result shows that nitrobenzole in a large dose destroys life rapidly. On opening the body the powerful odour of the liquid was everywhere perceptible, even in the blood. This odour remained strongly in the body when it was again examined, *fourteen days* after

* Compare a case by Dr. Wilks, 'Guy's Hospital Reports,' 1859, p. 131.

death. Twenty cubic centimeters (about five drachms) given to a middle-sized dog produced no remarkable symptoms. After some hours the animal was observed to be dull and languid; in twelve hours there was profound coma, with slow respiration, and coldness of the skin, but there were no convulsions. The animal was then killed. All the solids and liquids of the body, including the blood, had a strong odour of the poison, and some drops of the oily liquid were separated from the contents of the stomach. The fluid on which it floated had a strong alkaline reaction. The blood retained the odour for several days.

Passing from experiments on animals to the effects produced on man, the following cases are of interest; they tend to show that, as in the action of chloroform and fusel-oil, the vapour is much more potent than the liquid.

Mr. Nicholson ('Lancet,' Feb. 1, 1862, p. 135), in referring to one fatal case of poisoning by the liquid, states that he has known several instances in which the *vapour*, as it is evolved from almond-glycerine soap, has seriously affected females. A friend of his, who used a cake of this soap in taking a warm bath, fainted from the effects of the vapour of nitrobenzole set free, and was ill for some time afterwards. In July, 1863, Mr. Fotherby communicated to me a case of poisoning by this compound, in which the symptoms so closely resembled those of the essential oil of bitter almonds, that it was at first supposed this oil had been taken. A woman aged thirty tasted a liquid which had been used for flavouring pastry, and, perceiving that it was very acrid on her tongue and lips, spat it out immediately and washed her mouth with water. She thought she could not have swallowed more than a drop, but in replacing the bottle she spilled about a table-spoonful on the table, and did not immediately wipe it up. The vapour strongly impregnated the air of the small room in which she was, and produced a feeling of sickness in another servant. The burning taste in the mouth was immediately followed by a sensation of numbness and tingling in the tongue and lips, and a strange feeling for the next hour. As the woman became worse, Mr. Fotherby was called in, and saw her in an hour and three quarters after the occurrence. Her aspect was then quite typical of prussic-acid poisoning; the eyes were bright and glassy; the features pale

and ghastly; the lips and nails purple, as if stained by black-berries; the skin was clammy, and the pulse feeble. Her mind was then clear, and she described how the accident had occurred and what her sensations were. She was able to swallow a mustard emetic, after which she became rapidly worse; lost her consciousness; the teeth became set, the hands clenched and blue, the muscles rigid and convulsed. She vomited freely a pale fluid matter, which had the peculiar odour of nitrobenzole. The stomach-pump was used, but the fluid washed out of the organ had hardly any odour, owing, probably, to the small quantity actually swallowed, and its removal by absorption. The breathing became much reduced, and the pulse could scarcely be felt. In about eleven hours there was reaction, consciousness returned, and she was able to swallow. At the end of seventeen hours she was much better; but she then complained of distorted vision with flashes of light and strange colours before her eyes. For some weeks she continued weak. It was at first supposed the woman had swallowed a larger quantity of the liquid than she had imagined; but it is obvious, from the entire absence of the odour in the fluid drawn off by the stomach-pump within about two hours, that but little could have passed into the stomach. There is no doubt, from what has been observed in other cases, that these severe symptoms were chiefly due to the breathing of the vapour in a concentrated form. A fellow-servant who was in the room at the time the nitrobenzole was spilled also suffered from the inhalation of the vapour. Mr. Fotherby sent to me a portion of the liquid, and I found it to be pure nitrobenzole, unmixed with any essential oil of almonds.

A case of poisoning by this liquid, which was the subject of an inquest at Ramsey, in the Isle of Man, is reported in the 'Pharmaceutical Journal' for December, 1862, p. 283. A clerk in some Chemical works took, on the 6th of November, a few drops (supposed to have been fifteen) of nitrobenzole. Imme-diately afterwards he felt unwell, and became insensible. Stimulants restored consciousness, but there was a relapse, and he died the next day. The following case occurred at the London Hospital:—A boy æt. 17, while drawing off some nitrobenzole by a siphon, swallowed a portion of the liquid. There were no immediate symptoms, but he soon felt sleepy,

and when at dinner ate but little, and said he felt as if he was drunk. This was between two and three hours after he had swallowed the liquid. He fell into a stupor, which became deeper and deeper, until death took place, without vomiting or convulsions, twelve hours after the ingestion of the poison. (Dr. Mackenzie, in ' Med. Times and Gaz.,' 1862, vol. i, p. 239.)

In a paper communicated to the Royal Society in 1863 Dr. Letheby describes this and another case which fell under his observation—that of a man æt. 43, who spilled a quantity of nitrobenzole over his clothes, and went about several hours breathing an atmosphere saturated with the vapour. The effects were nearly the same in both cases ; although in one the poison was inhaled in vapour, and in the other it was swallowed as a liquid. For some time there was no feeling of drowsiness in this man ; gradually, however, his face became flushed, his expression stupid, and his gait unsteady ; he had the appearance of a person who had been drinking. The stupor gradually increased, until it passed into profound coma, and in this state he died. The progress of each of the fatal cases was much the same as that of slow intoxication, excepting that the mind was perfectly clear until the coming on of the fatal coma. This was sudden, like a fit of apoplexy, and from that moment there was no return of consciousness or bodily power ; the sufferer lay as if in a deep sleep, and died without a struggle. The duration of each case was nearly the same. About four hours elapsed from the time of taking or inhaling the poison to the setting-in of the coma, and the coma lasted five hours. The *appearances* after death were—flushed face, livid lips ; the superficial vessels of the body, especially about the throat and arms, were gorged with blood, which was every-where black and fluid. The dependent parts were turgid, the lungs somewhat congested ; the cavities of the heart were full of blood ; the liver was of a purple colour, and the gall-bladder distended with bile ; the brain and its membranes were congested, and in the case of the man there was much bloody serosity in the ventricles. Nitrobenzole, as well as aniline, into which it appears to be partially converted in the body, was detected in the brain and stomach. (' Proc. Royal Soc.,' 1863, No. 56, p. 550.) It is not stated what the result of the analysis, if any, was in reference to the case of death from the

vapour in which the poison was absorbed through the lungs. In performing some experiments on animals Dr. Letheby found that the local action on the stomach was slight; there was rarely any vomiting, and there was either rapid coma or a slow setting-in of paralysis and coma, after a long period of inaction. There was a complete loss of voluntary power, a spasmodic fixing of the muscles of the back, with violent struggles, a look of distress, and occasionally a kind of epileptic fit. The pupils were widely dilated, the action of the heart was irregular, and the breathing difficult. The time of death, in the more rapid cases, varied from twenty-five minutes to twelve hours after the administration of the poison. In other experiments, in which smaller doses were given, the time that elapsed between the administration of the poison and the coming-on of the first symptoms (an epileptic fit) varied from nineteen to seventy-two hours; in most cases it was about two days, and the time of death was from four to nine days. The appearances were similar to those already described. When death had taken place within twenty-four hours the odour of the nitrobenzole was clearly perceptible in the stomach, brain, and lungs; and aniline (from the chemical conversion of nitrobenzole) was found in the organs. In the slower fatal cases, the odour had often entirely disappeared, but traces of aniline could be detected in the brain and urine, and sometimes in the stomach and liver. Occasionally no aniline was found, although death had taken place from the poison!

This narcotic compound differs from the ordinary narcotics in its powerful and persistent odour, which would render it difficult for a person to administer it, either in liquid or vapour, unknowingly to another; in the production of profound coma at an uncertain interval after the stupor; and in the rapidly fatal effects when coma has followed. It operates powerfully as a poison in vapour as well as in a liquid state; but, so far as cases have yet been observed in the human subject, the symptoms resembling those of the first stage of narcotic poisoning have very soon appeared. The rapidly fatal cases only would be likely to be mistaken for apoplexy, but in these the poison would be detected by its odour.

Analysis.—Nitrobenzole, or essence of Mirbane, is a pale

lemon-coloured oily liquid, of a strong odour, resembling that of bitter almonds. It has a pungent, hot, disagreeable taste. It gives to confectionery the smell but not the pleasant taste of oil of bitter almonds. It destroys the colour of litmus, and gives a greasy stain to paper, leaving a yellow mark when the stain disappears. It sinks in water, and is partly dissolved, giving to it a yellowish colour. It is soluble in alcohol, ether, and chloroform, but when agitated with water it is in great part separated from its ethereal and chloroformic solutions. It has no basic qualities; its aqueous solution is not precipitated either by tannic acid or the chloriodide of mercury and potassium. It is highly combustible, burning with a yellow, smoky flame. It yields no Prussian blue when mixed with sulphate of iron, alcohol, and potash, and its vapour produces no cyanide of silver in a solution of the nitrate. It is distinguished from all other liquids, excepting the essential oil of almonds, by its odour, and from this oil by the following test :— Pour a few drops of each liquid on a plate, and add a drop of strong sulphuric acid. The oil of almonds acquires a rich crimson colour with a yellow border, the nitrobenzole produces no colour. In order to separate it from organic liquids, they may be acidulated with sulphuric acid, and submitted to distillation. If any of it exists in a free state, its odour will be sufficient for detecting its presence. If converted into aniline, another process will be required. There is no probability that this liquid will be successfully employed for the purposes of murder without the certainty of detection.

9. *Poisoning by Aniline.*

This is a narcotic poison in liquid or vapour resembling nitrobenzole in its toxicological effects. Schuchardt found that a small rabbit was killed by sixty drops in six and a quarter hours, and a large rabbit by one hundred drops in four hours. There was loss of sensibility, with loss of heat; and violent clonic and tonic convulsions ensued, which continued until death. From experiments hitherto performed, it does not appear to be an active poison as a liquid, and it seems to affect the spinal marrow more than the brain. It has also a local

irritant action. Dr. Turnbull gave half a drachm of the sulphate to a dog. In two and a half hours, the animal vomited, and an hour later it was purged. It became dull, weak, and tremulous; the pulse was rapid, and the breathing laboured. The feet were cold, the hind legs paralyzed, and the tongue was of a blue colour. In five hours the symptoms abated, and the next day the animal had recovered. ('Lancet,' Nov. 16, 1861.)

Dr. Letheby found that aniline given to dogs and cats in doses of from twenty to sixty drops caused a rapid loss of voluntary power. The animal staggered and fell upon its side powerless, the head was drawn back, the pupils were dilated, the breathing was difficult, and the action of the heart tumultuous; there were slight twitchings or spasms of the muscles, and the animal quickly passed into a state of coma, from which it did not recover, death taking place in from half an hour to thirty-two hours. On inspection the brain and its membranes were congested, the cavities of the heart were nearly full of blood, and the lungs slightly congested. The blood all over the body was black and coagulated. The poison was easily discovered in the brain, the stomach, and the liver, although it was found that, as nitrobenzole is changed into aniline, so in some cases aniline and its salts are converted into mauve or magenta. This arises from the oxidation of the salts, and it has been especially observed on the surface of the body. ('Proc. Royal Society,' No. 56, 1863, p. 556.) There is no instance recorded of the effects of aniline as a poison on the human body. It is a liquid of nauseous odour and taste, and could hardly be taken or administered without the consciousness of the person taking it. The salts appear to have very little action. They have been used medicinally in large doses without producing any unusual effects. In one case 406 grains of the sulphate of aniline were given to a patient in the London Hospital, in the course of a few days, without any symptoms of poisoning. (Dr. Letheby, *loc. cit.* See also cases by Dr. Fraser, 'Med. Times and Gazette,' March 8, 1862, p. 239.) It is difficult to suppose that combination with an acid to form a perfectly soluble salt can render aniline inert, as this would be contrary to experience in reference to other bases, *e. g.* nicotina and conia; at the same time, if we except

the action of the vapour, no case has occurred which will enable us to solve the question.

There are facts which show that the *vapour* of aniline, even when much diluted, exerts a poisonous effect on man. Mr. Knaggs met with a case in which a workman accidentally broke a carboy containing a large quantity of this liquid; the aniline fell over him, but none entered his mouth. In his anxiety to wipe up the aniline he respired the vapour for some time, felt giddy, and complained of his head and chest. When seen some hours after the accident his face and body were of a livid leaden hue, the lips, gums, tongue, and eyes, of a corpse-like bluish pallor; he was breathing by gasping, and appeared at the point of death. There was no convulsion; he was sensible, and able to give a correct account of his feelings. His pulse was small and irregular. Under active treatment he recovered. ('Pharm. Journ.,' July, 1862, p. 42.)

Dr. Letheby relates the following case:—In July, 1861, a boy æt. 16 was brought into the London Hospital, in a semi-comatose condition. In scrubbing out an aniline vat he had breathed the vapour; and, although he did not suffer pain or discomfort at the time, he was suddenly seized with giddiness and insensibility. When brought to the hospital he looked like a person in the last stage of intoxication; the face and surface of the body were cold, and the pulse was slow and almost imperceptible; the action of the heart was feeble, and the breathing heavy and laborious. After rallying a little, he complained of pain in his head and giddiness. His face had a purple hue, and his lips, the lining membrane of his mouth, as well as his nails, had a similar purple tint. On the next day the narcotic symptoms had passed away, but he was remarkably blue, and looked like a patient in the last stage of cholera. These cases appear to show that aniline vapour is less poisonous than that of nitrobenzole, and that the symptoms follow more rapidly on the inhalation of the vapour. For a full account of the effects of aniline on animals, I must refer the reader to a pamphlet by Dr. Sonnenkalb, of Leipsic—'Anilin und Anilinfarben in toxikologischer und medicinalpolizeilicher Beziehung,' Leipzig, 1864, p. 20. The injurious effects to public health likely to arise from the employment of aniline

colours in confectionery and cosmetics are also fully described in this essay.

Analysis.—Commercial aniline is an oily liquid, of a reddish-brown colour, with a peculiar tarry odour. It produces a volatile greasy stain on paper. It is volatile and combustible, burning with a thick smoky flame. It falls to the bottom of water, and does not readily dissolve in it. It is quite soluble in alcohol and ether, but not in chloroform; in the latter property it differs from nitrobenzole. Diluted sulphuric acid combines with it to produce a white compound, which is soluble in water. A solution of chloride of lime added to the acid watery liquid produces a splendid colour of various shades of purple and red.

The solution of sulphate of aniline is not precipitated either by tannic acid or chloriodide of mercury and potassium; but aniline itself, in the small quantity in which it is dissolved by water, yields, like the alkalies, a yellow precipitate with arsenio-nitrate of silver. It also reduces completely a solution of chloride of gold—precipitating metallic gold. A minute quantity of aniline may thus be detected. When pure aniline is heated with powdered corrosive sublimate, it produces a rich crimson dye. When present in organic liquids, aniline may be separated by digesting the concentrated liquid in alcohol, mixed with a little diluted sulphuric acid. The alcoholic extract, distilled at a high temperature with a solution of potash, yields aniline in the receiver. This may be tested by the methods above described.

10. *The Process for Detecting Chloroform in the Blood.*

The process usually adopted consists in placing the liquid supposed to contain chloroform in a Florence flask, the neck of which is fitted with a cork, perforated to admit a hard glass tube, bent at right angles, and having a length of from twelve to fifteen inches. The flask is gradually plunged into water at about 160°, and at the same time the middle portion of the tube is heated to full redness by an air-gas jet. At a red heat chloroform vapour is decomposed, and chlorine and

hydrochloric acid are products of its decomposition. Litmus paper applied to the mouth of the tube is reddened; starch paper wetted with iodide of potassium is rendered blue, and nitrate of silver is precipitated white.

Two drops of pure chloroform were thus readily detected, and so persistent was the vapour in the flask that it was detected after one, two, and even three weeks, although nothing could be seen in the flask. Two drops added to a quantity of putrefied blood were detected by a similar process after a fortnight, the flask being closed, but the mouth of the tube remaining exposed to the air. This method of detecting chloroform by its products in experiments thus conducted appears to be perfectly satisfactory. In practice, however, it will be found a very difficult matter to detect it, even where we know that it has been administered. Some years since, in conjunction with the late Dr. Snow, I examined by this process the blood of a boy who had died in Guy's Hospital from the effects of chloroform vapour, but without detecting any trace of it. There was no odour in the blood, and the result was negative. In 1863 I examined on three occasions blood taken from patients while they were under the full operation of chloroform. It was brought from the operating-table of Guy's Hospital, where it had been collected in closely stopped glass bottles. One of the samples, examined within half an hour after removal from the living body, had no odour of chloroform, and gave not the slightest chemical indication of its presence. The two other samples kept in close bottles until tested forty-eight hours after removal, did not contain a trace of chloroform vapour. Either the quantity in a few ounces of blood is too small for detection, or it is rapidly lost by its volatility, or it is converted in the blood into formic acid or some other product, and is thus withdrawn from this method of analysis.

SELECT CASES OF ANEURISM.

By EDWARD COCK.

I HAVE selected from the cases of aneurism which have come under my care during the last twenty years a few whose unusual complications or peculiar features may perhaps render their publication useful. Amongst them are cases where extensive disease of the heart and aorta existed at the time of operation. Also cases where pressure had failed. A case in which the common iliac artery was tied, with eventual success, after suppuration of the sac. Another in which the external iliac was tied, and which subsequently proved to be aneurism of the profunda. Lastly, a case of lesion of the profunda, the true nature of which was not ascertained until after death.

CASE.—*Popliteal aneurism; diseased aorta; pressure tried and failed; artery tied; hæmorrhage.*—David McE—, æt. 25, admitted into Luke, under Mr. Cock, May 20th, 1848. A printer, and works at press; also a pugilist, and has fought several battles. Married five years. From a boy has lived a most debauched, intemperate life, but is still strong and muscular. For last year and half has had frequent cough, with expectoration tinged with blood.

During several weeks has had pain in left knee and leg, which he has aggravated by muscular exertion. Has a small aneurism of left popliteal artery. General vascular system

deranged, with probably dilated aorta, diseased valves, and regurgitation.

Every possible contrivance was adopted to maintain pressure on the artery in the thigh, and, being an intelligent man, of great courage and determination, he lent every assistance in his power, but without success.

No modification of apparatus could be borne, and, the pain in the popliteal space becoming unbearable, I tied the femoral artery June 7th. He repudiated chloroform, refusing to take any of the " damned stuff."

He progressed favorably after the operation, and the ligature came away June 22nd. The wound healed slowly. The tumour in the popliteal space entirely disappeared, and all the severe symptoms connected with his arterial system became greatly reduced in intensity.

He left the hospital July 25th, greatly improved in health, but the cicatrix over the wound was hard, and a sinus still existed, which did not heal until some weeks afterwards. He returned to his former occupation, and I am afraid also to his somewhat irregular and dissipated habits.

He died about eight years after the operation had been performed, from heart disease and general anasarca. He was attended by the late Dr. Hughes, who had taken much interest in the case.

CASE.—*Small popliteal aneurism cured by pressure.*— B—, æt. 27, admitted into Lazarus, June 13th, 1854, under E. Cock. Carpenter, married six years. Temperate and steady. Healthy. Excitable, sanguineous temperament. About three months previous to his admission he " sprained" his right leg by falling between two joists, and began to suffer from variable " rheumatic pains" in the limb, but was not prevented from continuing his work in full vigour. A week previous to his admission he became aware of a tumour in the ham, but continued to labour at his craft and to walk eight miles a day until he came into the hospital. The aneurismal sac was then about as big as a hen's egg, immediately behind the knee-joint ; contained fluid blood ; could be readily emptied when the artery above was compressed ; the pulsatory dilatation most strongly marked. There was no pain, tenderness,

nor swelling of the leg. The anterior and posterior arteries pulsated forcibly at the foot, and the impulse of the heart and all the arteries of the body was abnormally powerful. Spare habit, muscles well developed, and in perfect health. During the first week his treatment consisted in total rest, the administration of digitalis, low diet, and as little fluid as possible. The compressing apparatus was then applied. He readily made himself master of its mechanism and object, and took the management of the instrument into his own hands. The force of his circulation, the size of his muscles, and the looseness of the connecting tissues, occasioned more than ordinary difficulty, but, by careful management, and by shifting the pad from the groin to one third down the thigh, he was able to keep the artery under very efficient control, and to diminish, although never entirely stop, the flow of blood through the sac. At one period, when the thigh became chafed, the object was still maintained under diminished pressure by bending the knee and thigh nearly at right angles, which position he preserved for nearly two weeks. At the end of July the pulsatory dilatation of the aneurism had entirely ceased, although a current of blood could still be felt permeating the small solid tumour which had replaced the original sac.

As his health was beginning to suffer from the confinement, and the object in view had been effected, the pressure was discontinued, a pad of wool was placed behind the knee, and a roller applied from the foot to the middle of the thigh, and he was allowed to walk about. At the end of a week an examination was made. No alteration had taken place; the site of the aneurism could be felt feebly pulsating, and the arteries of the foot could be readily distinguished. He was considered as cured, and left the hospital.

CASE.—*Aneurism of the femoral, occupying the upper angle of the popliteal space ; pressure tried and failed ; artery tied.*—James C—, æt. 30, admitted into Lazarus, under E. Cock, January 12th, 1855. Labourer from the country. Health good. His account is that in the autumn of 1854 he underwent very severe labour (hop-picking), and in September began to suffer from "rheumatic" pains about his knee. Two months ago he first perceived a swelling in the upper part of

the popliteal space, which has since rapidly increased in size. The aneurismal tumour is now very large, situated at the lower third of the thigh, and, no doubt, produced by lesion of the artery just as it emerges from the femoral canal. The sac extends completely across the thigh-bone, bulging out backward on either side, and widely separating the flexor muscles as they diverge to form the hamstrings. Its widest axis is laterally, and it does not descend into the popliteal space proper. The constant throbbing pain in the tumour is very great, and the pulsatory dilatation very strong. It was found very difficult to command the artery, either at the groin or lower down, and when a trial with the apparatus was adopted he was unable to bear the most moderate pressure of the screw, as it produced intense pain. The artery was tied in the upper third of the thigh January 23rd. The ligature came away February 3rd, and he lost a few ounces of blood at the same time. The wound, which had shown healthy granulations a few days previously, was now pale and flabby. There was, however, no more bleeding, and the patient's health improved under tonics and liberal diet. The wound was healed about the end of February, and he left the hospital a few weeks afterwards. The sac had then diminished to about a third of its original size, was firm and hard, and seemed to contain nothing but solid fibrin.

Case.—*Supposed aneurism of the upper femoral; ligature on external iliac; subsequent hæmorrhage; sudden death from diseased aorta.*—W——, æt. 26, admitted into Naaman, November 18th, 1857, under E. Cock. A baker, steady and temperate, but delicate, with very small, badly developed thorax. An examination gave evidence of diseased heart and aorta, perhaps aneurism of the arch. During a considerable period he had complained of pain in the chest. A month ago began to feel pain in the lower part of right groin, which he considered rheumatic, and treated with mustard poultices. There is now a considerable aneurismal dilatation, apparently of the upper third of the femoral artery, the sac extending upwards under Poupart's ligament. The pain is constant, and most intense in the thigh, knee, and calf, probably from pressure on the anterior crural nerve. Has had no blow, strain,

or injury whatever. The external iliac artery was tied November 23rd, about an inch above Poupart's ligament. The pain ceased immediately after the operation, and a rapid improvement in his health soon took place. He, however, continued to complain of crawling, creeping, tingling sensations over the lower extremity, which gave him much disturbance, probably occasioned by the gradual development of the collateral circulation. The ligature came away December 8th, and about the same time there appeared to be a moderate pulsation in the femoral artery, just below Poupart's ligament, the supposed seat of the aneurismal sac. A few days afterwards this pulsation was not to be felt. The wound healed slowly, and in the beginning of January a small speck of granulation still remained in the centre of the cicatrix. On the night of January 8th he suddenly lost more than a pint of blood. No further hæmorrhage occurred, but there still remained an uncicatrized spot in the centre of the wound, presenting a pale granular surface, like the end of a fistulous sinus. On the night of January 24th he died suddenly in his bed.

Inspection.—The dilated left ventricle, the diseased mitral valve, and the entire degeneration and destruction of the aortic valves, fully accounted for the sudden death.

The iliac and femoral artery were normal and healthy, and the supposed femoral aneurism proved to be one of the profunda artery. A large sac still existed, filled partly with solid fibrin and partly with soft grumous blood. The sac was in contact with the bone, which it had denuded of its periosteum, and rendered scabrous. The entire iliac artery above the ligature was occupied by coagulum. Below the ligature the artery was empty. The ends of the vessel divided by the ligature were not sealed, and a probe passed readily from below Poupart's ligament through the intersection into the clot above. Between the divided ends of the artery, and anterior to them, was a small mass of soft coagulum, which communicated by means of a sinus with the unhealed fistulous spot in the centre of the cicatrix.

The hæmorrhage had probably come from the open mouth of the artery below, and in all probability, had not the patient died, a repetition of the bleeding would have occurred.

Case.—*Popliteal aneurism ; ligature of the femoral ; hæmor-*
rhage ; the artery re-tied ; recovery.—George W—, æt. 43,
admitted into Naaman, under E. Cock, September 16th,
1863. Nine months ago began to feel pain in left ham and
calf of leg. Was treated for rheumatics, although a swelling
in the popliteal space was then apparent. The pain diminished
during a month's rest, but the swelling increased. On
resuming his work the swelling and pain increased, but he
continued his employment under great suffering until his
admission. The swelling was then very large, occupied the
whole of the popliteal space, and bulged out behind and on
either side, so as to prevent flexion of the joint. He remem-
bers straining himself eighteen months ago, and the knee was
painful for a few days after. Flexion of the thigh on the
body was tried for a short time, but could not be borne.

Mr. Cock tied the artery at the upper part of the thigh,
October 6th. He progressed favorably, the swelling of the
limb subsided, the size of the sac diminished, and the
wound healed almost by the first intention. The ligature,
however, did not come away, and on the evening of the 28th
he suddenly lost a very large quantity of blood from the
wound. Mr. Forster was sent for, and cut down upon the
artery above the place where it had been tied, and placed a
second ligature on the vessel. The original ligature still
remained in the wound. No further bleeding occurred. The
first ligature came away November 3rd, and on November
14th the second ligature separated. He slowly recovered his
strength, which had been much impaired by the loss of blood.
The wound healed, and he left the hospital well December
31st.

Case.*—*Aneurism of right iliac artery ; ligature of common*
iliac ; suppuration of the sac ; recovery.—Wm. W—, æt. 27,
admitted into Naaman's ward, June 15th, 1863. Engineer;
stands five feet nine inches, fair and stout. Has lived some-
what freely ; passed some years in Italy. Health always
good.

States that about ten months ago he first felt a sharp pain

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[1] Reported by Mr. Cock's dresser, Mr. Hindle.

in his right leg, like cramp. This pain was much increased
when he walked, sometimes obliging him to sit down, but he
still continued his work. In about four or five months he
began to feel a little pain in the right groin, which gradually
increased in violence, and on applying his hand to the part a
jumping and throbbing could be felt. The pain, both in the
groin and leg, varied at different times.

About five months ago his right leg and foot began to
swell, and continued to do so until he could not get his boot
on; he then gave up work and came from South Wales to
London to see a surgeon; the swelling in the groin now began
to increase a good deal. The surgeon who saw him ordered
eight leeches to the swelling, a warm poultice to the leg, also
a liniment to be used; this treatment was kept up for just
four weeks, with no good result; indeed, the swelling in the
groin got larger. The patient now went to Mr. Cock,
who examined him, and told him to come into Guy's Hospital.
He was admitted on the 15th of June with aneurism of the
external iliac artery on the right side. The patient says
he never had a blow or other injury likely to cause the
mischief.

On admission.—There is a large swelling in the right groin,
extending downwards to Poupart's ligament, upwards to within
an inch of the umbilicus, outwards nearly to the crest of the
ileum, inwards to the middle line of the body, perhaps in one
part a little over that line. The swelling pulsates in all parts;
an aneurismal murmur is to be heard—a to-and-fro sound, like
a person using a saw; feels hard, as if there was a thick wall;
the leg and foot are swollen; the patient otherwise is in good
health.

By making pressure with the hand on the abdominal aorta
the pulsation in the tumour is nearly, if not quite, arrested.
The superficial veins of the thigh are enlarged. Pulsation
good in both anterior and posterior tibial arteries.

The leg was ordered to be raised a little. Ice to be applied
to the tumour; with a view of lessening its bulk. To have
middle diet, with a small quantity of fluid; this treatment was
kept up till the 29th of June; the tumour decreased a little in
size under this plan.

29th.—R. Pulv. Rhei c. Calomel. gr. xv, statim, to clear

out his bowels, as it is proposed to operate on him the next day.

30th.—Operation under chloroform by E. Cock.

The incision was commenced about an inch above the spinous process of the ilium, and carried down with a slight curve to a point over the internal ring. It was subsequently found necessary to extend the cut at least two inches higher, forming altogether an incision between seven and eight inches, in length. A thick layer of fat covered the abdominal muscles, which were successively divided until the iliac fascia was laid bare. Several circumstances rendered these steps of the operation tedious and difficult. The aneurismal sac occupied nearly the entire cavity of the iliac fossa, leaving a very small space for the necessary manipulation. The tumour itself was immovably and firmly adherent to the iliac fascia behind and the abdominal walls before. The quantity of interstitial fat, the venous hæmorrhage, and the great depth of the wound, owing to the projection of the tumour, reduced the operation merely to one of exploration by the finger unaided by the eye, A few arteries were tied, but the venous congestion of all the tissues was such that every touch of the knife filled the cavity of the wound with blood.

The peritoneum was firmly adherent to the surface of the sac, but by working upwards with the finger and a blunt knife it was raised and the parts above the tumour were reached. It was found quite impossible to bring the common iliac artery into view, but its situation was ascertained and its pulsation felt by the extremity of the forefinger.

An armed needle was then carried along the finger, and passed under the artery from within to without. By raising the peritoneum and sponging out the cavity of the wound, the point of the instrument was rendered just visible, and the ligature was brought out and the needle withdrawn. As far as could be ascertained by the sense of touch, the needle had passed cleanly round the artery, without including any other tissue. Traction on the vessel by the ligature evidently commanded the artery. The ligature was then tied, and pulsation in the tumour immediately ceased.

The wound was brought together with sutures, and covered

lightly with wet lint, the leg enveloped in wool and a warm blanket, was slightly raised; ℞ Opii gr. ij statim, et rept. gr. j post horas sextas.

Seemed pretty well, and was not at all sick after the operation, although he was under the influence of chloroform for an hour.

July 1st.——Comfortable; heat in the leg good. To have sherry ℨiv.

2nd.——Doing well; to have brandy ℨiv. A little venous oozing from the wound. Towards evening he was a little restless. ℞, gr. j of opium, and brandy ℨviij.

3rd.——Doing well.

4th.——Does not eat very much, but there is nice healthy pus from the wound,

5th.——The swelling is less and softer.

7th.——Bowels open for the first time after the operation.

8th.——All the ligatures from the small vessels have come away.

11th.——Doing well; the swelling has gone down just two inches, and feels much softer; he has no pain; he had no peritonitis at all after the operation.

12th.——His appetite is good, and he keeps improving.

16th.——The ligature from the iliac artery came away to-day, just seventeen days since the operation; it was quite loose in the wound, which is healing fast, being only open for an inch or two in the middle; there are nice healthy granulations.

His progress towards recovery was not, however, maintained. Within a week after the last report he became the subject of rigors, fever, and severe constitutional irritation. At the same time the tumour became painful, swollen, and tender. It was evident that suppuration of the aneurismal sac had commenced. His condition, both general and local, occasioned much anxiety for some days, when he was suddenly relieved by a copious discharge of grumous decomposed blood mixed with pus, and most offensive in character. During several days the broken-down contents of the sac were evacuated through the wound. The suppuration then assumed a healthier character, and he rapidly improved in health. The wound gradually closed, and when he left the hospital

September 9th, the tumour was reduced to little more than a third of its original size.

A few months after he left the hospital he was seen to be in perfect health and free from all untoward symptoms.

CASE.—*Spontaneous lesion of the profunda artery of the thigh, giving rise to local conditions and constitutional symptoms, the real nature of which was not ascertained until after death.*—On the 28th of June, 18——, I was requested to visit Mr. ——, a young gentleman æt. 20, delicate in frame and constitution. I found him with an enormously swollen right thigh, accompanied by severe constitutional symptoms, pain, and fever. There had been no cause or circumstance which would account for his condition. The history was this :—Five weeks ago he became the subject of swelling and some pain about the right ankle, considered to be rheumatism; three weeks ago a roundish, hard swelling was perceived in the middle and anterior part of the thigh; three days ago it suddenly enlarged, and became rapidly and extensively diffused over the thigh. It was considered to be sub-fascial abscess.

A careful examination of the limb induced me to arrive at a somewhat different conclusion. I found a large diffused swelling occupying the greater part of the anterior half of the thigh. It was firm and tense rather than fluctuating, yielding slightly to pressure, and somewhat elastic. It was evidently deeply seated, covered by the fascia, and probably between the muscles. A grooved needle appeared to pass into a cavity, but brought away nothing but blood, or rather serum deeply mixed with blood. It seemed pretty certain that the mass consisted of blood, which had been rapidly poured out by the lesion either of a blood-vessel or of some vascular structure. The alteration in the position of the femoral artery was also remarkable, and to a certain extent indicated the locality where the mischief had commenced. The femoral artery, during its whole course from Poupart's ligament to the lower third of the thigh, was pressed forward, and might be traced as a subcutaneous vessel. Its pulsation was plainly felt, and, except from its altered position, it seemed to be normal and healthy. Thus it would appear that the blood, which formed the bulk of the swelling, had been derived from a

source of greater depth, and in fact behind the tract of the femoral artery.

We were unable to decide whether one of the deep posterior branches of the femoral had given way, or whether some malignant growth, probably connected with the bone, had broken up and produced an extensive extravasation of blood. Not the slightest pulsation could be detected in any part of the swelling. The leg and foot were œdematous, but the anterior and posterior tibial could be felt faintly pulsating at the ankle and instep.

The condition of our patient and the doubtful nature of the disease precluded the expediency of any active measures; and all we could do was to relieve his sufferings by the position of the limb and by opiates, at the same time to keep up his powers by nourishment.

I saw him again on July 14th. He was better in health, but a few days previously a sudden attack of pain in the thigh had been followed by a manifest increase of the swelling, indicating that a fresh effusion of blood had taken place.

My next and last visit was on July 30th. He was considerably improved in health, and the thigh was smaller and less tense. It was thought advisable to take this favorable opportunity of removing him into the country. He died somewhat suddenly on August 13th.

The following account of the post-mortem was kindly forwarded to me.

The thigh was examined fifteen hours after death and presented the following appearances:

An incision was made from the centre of Poupart's ligament to the inner side of the patella, with a view of tracing the femoral vessels; nothing remarkable was observed until cutting through the deep fascia, when a large mass, from about a pound and a half to two pounds of laminated and semi-coagulated blood, presented itself; this occupied a very large cavity, and could be readily scooped out with the hands; it had all the appearance of being circumscribed, but no distinct sac surrounded it; all the tissues in its immediate vicinity appeared to have been absorbed, and the femur was denuded of its periosteum for about three inches.

The femoral artery was pushed somewhat outwards, and

was more superficial than usual, but in itself perfectly healthy.

The profunda was next examined; it was given off as usual, but about an inch and a half from its origin, an irregular opening, sufficiently large to admit a good-sized probe, was found, from which, no doubt, the blood escaped; a small fibrinous clot occupied the continuation of the vessel for about half an inch, when it became completely obliterated, and could be no further traced.

There were other matters connected with this case full of interest, but unfortunately no further examination could be obtained.

CLINICAL REMARKS

ON

CALCULOUS DISEASE.

By G. OWEN REES, M.D., F.R.S.

WHEN reflecting on the nature of disease as presented to us by a given set of symptoms, it may sometimes happen that we give undue weight to some one indication which we may have been taught to believe especially significant of a particular lesion, and to draw our conclusion accordingly. The danger of error, however, is perhaps quite as great in the opposite direction, so that we may be too prone to argue the absence of a lesion when some symptom is wanting which we may have looked upon as especially indicative of its presence. An apt illustration of the latter is found in the very common belief that calculus in the kidney is always attended with very obvious hæmaturia; and I have often known the presence of a calculus ignored upon this ground, notwithstanding that the general symptoms pointed strongly to the probability of its existence.

I use the expression "very obvious hæmaturia" in order to set aside the consideration of those cases in which blood is passed in such very minute quantity, or in so changed a form, that the patient fails to recognise it, and therefore does not speak of it in relating the history of his case.

It has not unfrequently happened that I have been asked to express an opinion when the patient has experienced almost every characteristic symptom of renal calculus except

hæmaturia, and when microscopical examination (made both on a first consultation and subsequently) has failed to detect even minute quantities of blood in the urine.

Having felt on these occasions a certain degree of uncertainty, I resolved, some three years ago, to determine as accurately as possible whether calculi, when present in the kidney, always produced hæmorrhage; or, on the other hand, might exist there without giving rise to that symptom.

With this point in view, I waited for cases to present themselves in which calculi had been passed by persons of intelligence and observers of their health, and the four following histories were soon afforded me. These I now give shortly, and merely to illustrate the point in question, premising that since they came under my observation I have seen several others very nearly identical in character.

Case 1.—Mr. E— has passed small uric-acid calculi at intervals during the last two years. Never saw blood in his urine. On close questioning, says he once saw his urine of a dark colour, but never saw anything which led him to believe blood was present. The urine is of normal specific gravity, free from pus, blood, and albumen. Uric-acid and oxalate-of-lime crystals in abundance. Has suffered severely from loin pain and other indications of renal calculus.

Case 2.—Mr. C— passed several small uric-acid calculi ten years ago. Since that date has generally passed two or three every year; the last three years still more frequently. Has never seen blood in his urine on any occasion, though he suffered very violent loin pain. Never observed his urine of dark colour. Urine natural; somewhat abnormally acid.

Case 3.—Mr. G— some few months ago passed an oxalate-of-lime calculus; feels now the same symptoms he then experienced. Never saw blood in his urine, but pain in the side has been excessive. Has observed his urine of dark colour several times. Says his medical attendant in the country never could find blood in his urine.

Case 4.—Mr. B— has passed several uric-acid calculi,

Never saw blood on any occasion. Has weary feelings over loins. Before the first calculi were passed he consulted an eminent London physician, who, after examining his urine, told him he was not suffering from any calculous or renal affection, and who filled up a satisfactory certificate for the insurance of Mr. B——'s life.

Now, cases such as these, when they first show symptoms, may be easily mistaken. There is no history of calculus nor of urinary deposit, nor of attacks of "gravel," such as are so graphically described by the sufferer; and *in the absence of hæmaturia* the symptoms are too apt to lead us far wide of the truth. In looking back to the cases I have seen, I am inclined to believe that the error most frequently committed is to mistake the symptoms of renal calculus for those of simple gouty dyspepsia and hepatic derangement.

While it is well known that a calculus may exist in the bladder without giving rise to the whole set of symptoms detailed in systematic works as indicative of its presence, and sometimes merely showing such slight symptoms as to render the diagnosis a matter of extreme difficulty, I have good reason to doubt that the profession generally is inclined to take the same view with regard to renal calculus; and thus I believe it has happened that calculous cases, such as I have alluded to above, have on occasion deceived most persons who have dealt much with disease. Let us take a case in illustration.

A gentleman in the legal profession, of gouty diathesis, has a sensation about the sacrum which he describes as weakness rather than pain. He is languid and dyspeptic. Urine natural; appetite capricious; bladder is rather irritable; occasionally rather a large quantity of urine passes. Treatment is directed to relief of gouty dyspepsia, and no other abnormal condition is suspected. In this case, after the lapse of several months, during which no benefit has been derived, the patient applies for further medical assistance. The urine has now become turbid. The specific gravity is still natural. The deposit consists of pus, and the urine is albuminous in consequence. The other abnormal condition present is that the character of the epithelium indicates desquamation from the pelvis of the kidney; but this constituent is found only here

and there in small proportion on the field of view. The case is now treated as calculous disease, and is eventually proved to be such by several calculi passing at intervals.

These cases are not always diagnosed; and the reason they are not is, that blood is looked for in the urine, and is not found. If the diagnosis be not made, the pyelitis is explained otherwise, and its cause is sought for by very painful means. The catheter is used, under the belief that stricture exists, or that the bladder does not completely empty itself, owing to an enlarged prostate, or to partial paralysis, the pyelitis being regarded as a sequel to some one or other of the above-mentioned conditions.

It cannot be too strongly impressed upon the minds of practitioners that cases of renal calculus are frequently to be met with without the occurrence of hæmorrhage in such forms as to attract the attention of the patient, and that now and then we may even fail to detect it microscopically for days together, and find the first urinary indication of calculous disease in the existence of a purulent deposit.

It would have been impossible to prove absolutely that renal calculi were present in the above case, had they not been produced in evidence; but I have seen cases so completely resembling the above which have terminated in complete subsidence of symptoms, without the passing of concretions in any form, that I am persuaded renal calculus was the cause of the symptoms observed, and that the cure was effected by the calculus becoming encysted in the kidney. The following case may, I believe, be regarded as an illustration of the above view.

A lady of sedentary habits, who had generally enjoyed good health, was attacked with frequent call to pass water, and the urine was shortly afterwards observed to contain pus. When I saw her the urine was of specific gravity 1018, and contained pus-corpuscles in considerably quantity. It was preternaturally acid. Albumen was present, apparently, only in proportion to the pus-corpuscles. There were also some few crystals of oxalate of lime, and here and there some fragments of tube-casts in the deposit. There was no loin pain, and no history of hæmaturia could be obtained, unless we chose so to interpret the evidence of her

maid, who, when closely questioned, deposed to having once or twice observed her mistress's urine like tea in colour. Believing the case to be of calculous character, and that the object to be obtained was to allay irritation, by rendering the urine moderately alkaline, and to wait the result, I had the satisfaction of observing that the pus gradually disappeared from the urine, and after many months all symptoms ceased.

It had been noticed that rest always comforted the patient, and it was enjoined, but only so far as was consistent with the preservation of health, for carriage exercise was allowed.

In this case I feel very certain a calculus caused the symptoms, and that it is now encysted in this lady's kidney.

The symptom of frequent micturition, which so often occurs when the kidney is irritated by the presence of renal calculus, is not always to be expected, even in confirmed cases. When it is observed it assists much in the diagnosis; but we must not regard it as necessarily present, any more than hæmaturia. This has more than once been proved to me in a striking manner by persons who, having never before suffered any discomfort except what they called hæmorrhage, presenting themselves, and showing a calculus which they had passed somewhat suddenly. One gentleman of my acquaintance almost suddenly was seized in the street with violent pain in the side and retraction of the testicle, and on hurrying home passed bloody urine and a calculus, which latter must have been in the kidney many months without producing any other symptom than an uneasy sensation about the loins.

As regards the seat of pain in cases of renal calculus, I have heard it laid down as a rule that, even if it happens to exist on both sides of the body, it is always felt more on one side than the other. Now, this, though a good *general* rule, has very numerous exceptions, and I have frequently met with cases in which calculi have passed from the kidney after the occurrence of the full catalogue of symptoms usually described as significant of their presence, with the exception that no pain had been felt in the lumbar region. The whole discomfort in these cases has been referred to the sacrum, and so far as the patient could determine, not more on one side than on the other.

There is, again, a peculiarity with regard to the seat of pain when calculus exists in the right kidney which is very apt to

deceive, notwithstanding that it has been long ago described by the older writers.

The pain in these cases is referred to the right hypochondrium. It extends downwards towards the umbilicus, but not to the lumbar region. There is a feeling of great distension over the colon, and the bowels are constipated.

These are the symptoms so often regarded as significant of the passage of biliary calculus, an error easily committed if blood be not perceived in the urine.

Some few years ago I was witness to the doubt and anxiety caused by the above state of things. There was vomiting, with violent pain in the right hypochondrium, and the urine passed was of dark colour, but gave no indication of blood at first view. The diagnosis, however, was arrived at without the assistance of a microscope. This was done by having recourse to a very simple expedient, which I strongly recommend to those who may not have yet adopted it, viz., tilting the chamber vessel, and watching the receding edge of the mass of urine. On this being done in the above case, the blood-corpuscles showed themselves in a thin, shelving line of characteristic tint. This plan is very valuable on occasion, not only for showing blood-corpuscles, whether of natural colour or changed to green, but also for detecting crystals of uric acid should they be present in small number. The only precaution necessary in making the experiment is to take care that the vessel is tilted very slowly. In conclusion, I would wish to allude to certain urinary symptoms which have been regarded by some as significant of gouty inflammation of the bladder, but which, I am now satisfied, have nothing whatever to do with cystitis, and can only be regarded as connected with gout in the fact that they are caused by the presence of uric-acid calculi in the kidney.

These cases, occurring in gouty persons, commence with frequent micturition; no blood is passed, but after protracted irritation we eventually find pus in the urine. The pyelitis is mistaken for cystitis, owing to the excessive irritability of the bladder. The reason this symptom shows itself so prominently would appear to be that the urine is of more acid and therefore of more irritating quality than in most other cases of calculus, and that more difficulty is experienced in changing its character.

CASE OF POISONING BY ARSENIC

EXTERNAL APPLICATION;

TRANSFERENCE OF THE POISON FROM THE SKIN TO THE STOMACH.

By ALFRED S. TAYLOR, M.D., F.R.S.

In February, 1864, under the order of Secretary Sir George Grey, the following case was referred to me for investigation :

A girl æt. 9, the daughter of John Bootman, a farmer, at Wissett, near Halesworth, in Suffolk, died after a short illness, and without any medical attendance. The deceased was a daughter by a former wife, and resided with the father and stepmother. Charges of neglect and ill-treatment were made, and a strong suspicion arose among the neighbours that the child had been wilfully poisoned by the stepmother.

Mr. Haward, surgeon, of Halesworth, had been called in to see the child, but at too late a period to render assistance. The child was then dying. The evidence which he gave at the inquest comprises all that could be obtained of the medical history of the case. It was as follows :

" I know John Bootman and his wife, and have been their medical attendant. I never attended the deceased previously. On Saturday, February 14th, Bootman called at my surgery to consult me respecting his daughter, who had been unwell several days. I learned from him that the child

had suffered from lice in the head, and that to kill them he said he was afraid his wife had been employing an improper ointment: he thought she had used white precipitate. I said that ' If she had used only *that* it will do no harm, but if arsenic or any other poison had been applied the consequences might prove serious.' He did not state that the child was dangerously ill. I said ' If you think it necessary, I will go and see her at once.' He said he thought she was suffering from cold, and I prescribed some fever medicine, requesting him to send for me directly if the child became worse. He came again on Sunday, the 14th, and said the child was worse. I reached his house at three o'clock, and found the deceased child in a state of collapse. The extremities were cold; she was unconscious, and unable to swallow even liquids. My attention was directed to the state of the child's head; she appeared to have been suffering from porrigo, or scalled head. There was an ecchymosed spot on the forehead, and a discoloration also on the back of the neck. When I saw the deceased she was dying; it was impossible to do anything for her. From her symptoms she appeared to be sinking from the effects of some irritant poison. I made a post-mortem examination of the body on the Wednesday following, assisted by Mr. King. There was nothing remarkable in the external appearance of the body. The child was of average size, and well proportioned, and the body appeared to have had sufficient nourishment. The hair was matted by discharge, and there was a great accumulation of matter under the scalp. Heads of this character, if neglected, speedily get into a bad state. I have seen heads nearly as bad even in respectable families. There were no living lice on the head. There is no doubt that the head was in a neglected state, and showed great want of ordinary care and attention. The discoloration on the forehead and on the neck I was unable to account for. On examining the contents of the abdomen, the stomach and intestines were much inflamed, especially the duodenum, the mucous coat of which, as well as that of the stomach, was softer than usual. The mark on the forehead had nothing to do with the cause of death. The discoloration on the neck was probably caused by a mustard plaster which had been previously applied. My conclusion was that the child had died

from some irritant poison, probably arsenic, but whether taken by the mouth or by absorption through the skin, I could not say positively, but believe it to have been by the latter means. I should consider that some irritant poison had been absorbed or administered some days before death. I should imagine that when arsenic or other irritant poison had been absorbed through the skin, the pain would not be so severe and intense as if it had been taken into the stomach by the mouth. Arsenic in any form would be very improper treatment for such a state of scalp, or for any other external application."

The evidence of the father was to the following effect :—
" Thursday, the 4th of February, was the first day that my attention was drawn to the head of the deceased. She was at that time pretty well excepting a slight cold. I found a great many lice upon the head. Nothing that I am aware of, by way of ointment or lotion, had then been put on the deceased's head. On Friday night, the 5th of February, I told my wife to do something to the child's head. I asked her if she had any precipitate powder, and she said ' Yes.' I afterwards ascertained that she had mixed arsenic and lard with it, and applied it to the head. I did not know there was any arsenic in the house. She said she took it from the top of the clock. I asked her how the arsenic came there, and she said it had been in the house before she came to my house. I did not see the arsenic, nor did I ask my wife for it ; and I do not know of my own knowledge what was done with it. The deceased seemed pretty well on the Saturday and Sunday following,—the 6th and 7th of February. On Wednesday, the 10th, I found that she did not take her food as usual, and she looked very unwell. She was thirsty, and drank a good deal at times, and complained of a little pain in her body. I did not observe her particularly on Thursday, the 11th instant. I do not recollect noticing anything more as to the child's health until Friday evening, the 12th, when I asked her how she was, and she said ' Better.' On Saturday, the 13th, between eleven and twelve o'clock, I saw her lying on the bed. I then asked how she was, and she said she was very unwell. Her bowels had been moved, but she did not complain of any particular pain. My wife was

the only grown-up person that I know of with the deceased on Saturday. The eldest girl in the house was only eight years old. I remained with her about half an hour, and then I went to Mr. Haward, and got some medicine from him. I went home about five or six o'clock, and the deceased then appeared to be much in the same state as in the morning. I sat up with her all night. She was very restless, but quite sensible, and did not appear in pain. Her bowels were moved twice in the night. The motions were very loose. She dozed towards morning. She had gruel and a little brandy-and-water, and appeared to be warm and comfortable. When I awoke by her side, between seven and eight o'clock, she did not appear to speak so well. I asked her how she was, and she said 'I don't know.' I stayed with her for half an hour, and went off again to Mr. Haward about half-past eleven. I got home again about half-past two, and found the deceased unable to speak intelligibly. Mr. Haward came at three o'clock, and the deceased died about 5 p.m. (on Sunday, the 14th of February). She was dying when Mr. Haward came.

"On Wednesday night, the 10th, about 10 o'clock, I saw my wife put some ointment from a small box on the deceased's head. She rubbed it on with her finger on the back of the head. Then for the first time I observed that the skin of the deceased's head was broken. There was a good deal of matter oozing from it. The deceased complained that the ointment made it smart. My wife told me she had purchased the ointment from Mr. Reynolds, a druggist, of Halesworth, and that it was precipitate ointment. I never saw my wife beat the deceased. I heard the deceased complain of cramp in the legs on Friday night, the 12th, and also on the Saturday night following."

The stepmother, Sophia Bootman, was next examined; she described the circumstances under which the arsenic had been applied. Her evidence was as follows:—"I did not observe the state of the child's head until Thursday, February 4th. My husband pointed it out to me about ten days before the child died. On examination I found several sores, which were discharging. On Friday, the 5th, as I found she had a great many lice on the head, I took some precipitate powder,

which I had by me, and I took a little poison that lay on the top of the clock, and mixed the two together with pork lard, and made an ointment. They were both white powders. I put the ointment on the child's head, and rubbed it with my fingers all over the head. The quantity used was about the size of a walnut. I put all that I had of precipitate and arsenic into the pork lard. There was less than a teaspoonful of the powders, and about a teaspoonful of lard. The precipitate was bought at a druggist's. It had on it a printed label, with ' Precipitate : Poison,' printed on it. I got the other poison from the top of the clock. I found it there, in a piece of paper, when I first went to the house, four years ago. ' Poison' was written on the paper. It was a white powder ; I did not feel it. (It was not labelled ' Arsenic.') I do not remember ever having used it for anything. At the time I mixed the two powders together, I did not know what the powder was which I took from the top of the clock. I read the word ' Poison' written upon it." · In answer to the question, " If you did not know what the poison was composed of, for what reason did you put it on the child's head ?" the witness said, " Because I thought they were both alike, and I thought it would have the same effect as the other—namely, to kill the lice. As soon as I took the powder out I threw the paper on the fire. This was about five o'clock in the evening. My husband asked me if I had done anything to the child's head. I told him I had used the precipitate powder and the poison off the clock. The deceased did not appear to be poorly till the Wednesday. That was the first day I observed signs of severe illness. I did not observe anything previously, except that she appeared to be suffering from a slight cold. I am quite sure I did not apply this ointment more than that once, and that was on Friday, February 5th. I afterwards used some other ointment, but none of my own making. (This was white precipitate ointment, obtained from a druggist's. It was applied to the head on Wednesday, the 10th.) The deceased showed no symptoms of illness until the Wednesday before her death. The deceased appeared to cough very much, her breath seemed bad, and she appeared very thirsty, which I thought proceeded from fever and cold. I observed no difficulty in swallowing. Up to that day she ate

her breakfast as usual. I mixed the powders in the wash-house, with an old knife, on a plate. I took the lard first, and put the powders on it, and mixed it up. I am quite sure I spilt none of it. I washed the plate directly, and I burnt the paper at once. I gave the child the medicine prescribed (some cough medicine from a druggist's) twice a day. She appeared on the Thursday much the same as she was on the Wednesday. She seemed better on the Friday, and got up and dressed herself. There was no looseness of the bowels. She did not complain of pain until the Saturday, when she seemed decidedly worse. She complained of belly-ache, and said she felt sick, but she did not vomit. She was purged twice. I had not given her any aperient medicine. I observed nothing more. There was no twitching or cramp. She said in the afternoon her feet were cramped. She sat up in the bed about an hour on the Saturday. She ate some gruel and drank a good deal of brandy-and-water. She seemed much the same in the afternoon, but about five o'clock she appeared worse. She could not take her tea. On Saturday we sat up with her; she seemed very restless, and got no sleep till the morning. I did not hear her complain of pain. She was taken with purging about midnight. It was constantly running from her. She was not at all convulsed. On the Sunday morning she was not so well, and faltered in her speech. She gradually sank from that time. I observed a place in the back of the neck; it was where I had laid a mustard plaster. I did so because she complained of a pain in the back of her neck. I put on the mustard plaster on the Thursday. I can't account for the mark on the forehead. I first observed that mark on the Sunday. She could move her head. I did not ask her how the mark came on her forehead. She got out of bed on the Saturday night, and she might have fallen down then. She was alone when she got out of bed on that occasion. It was about ten days before the child's death that I first observed the state of the head. My other children's heads have been in the same state, but they were not sore. When I put the ointment on the head I had no idea that it would do any harm. I put it on to kill the lice and do the child good."

Under the peculiar circumstances of this case, Mr. Haward, the medical attendant, declined to give a certificate of the cause of death until a chemical analysis of the viscera had been made. It was a serious question, whether, apart from the evidence elicited at the inquest, arsenic might not have been secretly given to this child by the mouth. The medico-legal problem for solution was, therefore—Could it be determined by a chemical analysis, with the other circumstances of the case, that arsenic had destroyed life by external or internal administration?

For the purpose of the inquiry the following articles and portions of the body were delivered to me, properly sealed and secured, at the Chemical laboratory, Guy's Hospital, on the 19th of February, 1864 :—1. The stomach of deceased. 2. The intestines. 3. A portion of the liver. 4. A bottle containing four ounces of a brown liquid, said to be the contents of the stomach. 5. Two chip boxes, containing a white ointment. And 6. A portion of the scalp of the deceased.

Post-mortem appearances and Analysis.

The stomach and intestines.—The lining membrane of the stomach presented some inflammatory patches at the greater end. The coats were firm, not ulcerated or irritated in spots and streaks, as they commonly are where arsenic has been taken directly into this organ. This observation applies chiefly to the lining membrane of the stomach, on which arsenic usually spends its action. The surface of the lining membrane, examined by a magnifying glass, presented no appearance of arsenic or other mineral poison having been in contact with it. The upper part of the small intestines was most inflamed. No blood or undue effusion of mucus was found. This is most commonly met with when arsenic has been in direct contact with the stomach and bowels. The liver was soft and lighter in colour than usual, but its condition calls for no particular remark in reference to the cause of death. The contents of the stomach were slightly acid; they were of a brownish colour, from the presence of some bilious matter, and contained no blood (as in direct poisoning by arsenic), and only the usual amount of mucus. After four

days, by repeated washing, they deposited no mineral sediment, and no trace of solid arsenic could be discovered when they were examined by the microscope. The only substances found by a microscopic examination were portions of digested animal and vegetable food, oil-globules, and starch-granules. These different parts of the deceased's body were submitted to the usual tests and processes for the detection of arsenic, and the result was that slight traces of arsenic were found in four ounces of liver, as well as in the stomach and intestines. There were also similar slight traces of arsenic in the *contents of the stomach*, apparently in intimate combination with the mucus.

The scalp of the deceased was found to contain a large quantity of arsenic, combined with a quantity of mercury (white precipitate), which had been applied to it in the form of an ointment. The quantity of arsenic in the portion of scalp sent was estimated at about two or three grains. The two boxes of ointment consisted simply of white precipitate mixed with the usual ingredient (lard). There was no arsenic in either sample.

From the results of my analysis, and from a perusal of the depositions forwarded to me by the coroner, as well as from the information communicated by Mr. Haward, I am of opinion—

First. That this child died from the effects of arsenic, applied externally and absorbed into the system.

Secondly. The condition of the viscera in their appearances, the nature of their contents, and the minute imponderable quantity of arsenic present in them, is not consistent with the supposition that arsenic had been given in a solid form, or in a liquid form by the mouth, but is quite consistent with the absorption of the poison through the skin of the scalp and its diffusion by the blood, leading to its deposition in small quantities in the parts in which it was found.

In answer to some questions put by the coroner and jury at the adjourned inquest, it was stated that, when arsenic operated as a poison by external application, a long interval sometimes elapsed before the usual symptoms of poisoning appeared, and death did not take place until after several days. In this case there had been, according to the evidence, only one application

of arsenic, namely, on Friday, February 5th, and no sign of illness appeared until Wednesday, the 10th. There was then loss of appetite and thirst. The absence of vomiting in this case, and the slight purging the day before death, as well as slight pain throughout, were consistent with the view that arsenic had been applied externally and absorbed, and were not consistent with the ordinary mode of administration by the mouth. When swallowed, the poison produces speedily nausea, vomiting, purging and severe pain, these symptoms continuing so long as any of the poison remains in the stomach and bowels. Traces of arsenic might be found in the mucous fluids of the stomach, although the poison had not been administered by the mouth ; but, whether administered internally or applied externally, traces of arsenic would be generally found in the liver and other organs, provided the person had not survived sufficiently long for the whole of the poison to be thrown off or eliminated from the body.

Upon this evidence the coroner, Mr. Gross, of Ipswich, directed the jury—That if they were convinced that the stepmother had used the ointment for an improper purpose, it would be their duty to bring in a verdict of manslaughter; but if they thought that she had prepared the ointment, as she said, to do the child good, not knowing what the effect of such treatment would be, however culpable and reprehensible the neglect she may have shown to the poor child, it would be their duty to return a verdict that the deceased had died from arsenical poison ignorantly applied. *Verdict :* That Eliza Bootman had died from arsenical poisoning, through absorption, from an ointment ignorantly applied.

This case, in the slow access of the symptoms, their comparatively mild character, the absence of some of the most prominent (vomiting and gastric pain), and in the long interval between the application of the poison and death (*ten days*), resembles other cases of poisoning by the external use of arsenic. It will be observed, too, that there was in this case, as in others, inflammation affecting the stomach and bowels, pointing to the specific action of this poison on the mucous membrane of the alimentary canal.

In reference to the chemical analysis, it may be observed

that only minute traces of arsenic could be obtained by Reinsch's process from the liver, stomach, and intestines. A sufficient deposit was, however, procured to yield in each case a sublimate of octahedral crystals. It is worthy of remark that no mercury was found in the tissues or in the mucous fluids. The great insolubility of white precipitate may probably account for this.

The portion of diseased scalp was treated by the following process to separate arsenic from mercury, both of these metals having been detected in it :—The scalp was cut up, and, after some hours' digestion in two drachms of pure and concentrated hydrochloric acid, was submitted to distillation in a sand bath. This was carried to dryness. The acid liquid in the retort yielded arsenic by the application of Reinsch's process, as well as by that of Marsh. Arsenic was procured from it in the state of metal, and also in the form of arsenious and arsenic acids. The distillate, when so diluted, readily gave a precipitate of sulphide of arsenic with a current of sulphuretted hydrogen, and from the weight of sulphide obtained, it was calculated that the small portion of scalp sent contained from two to three grains of arsenic. The residue in the retort was diluted with water, and treated with pure copper, whereby a considerable deposit of mercury was obtained. Sublimates of the metal in the usual globular form were readily procured by heating the copper in tubes. It was observed that the whole of the arsenic had been removed from the scalp by this process of distillation.

One of the results obtained by this chemical analysis requires a remark. It will be observed that traces of arsenic were detected in the mucous fluids of the stomach of the deceased. Some years ago this would probably have been regarded as a positive proof that, whether applied externally or not, arsenic must have been swallowed by this child. Such an inference, however, is not justified by recent experience. It has been incontestably proved by experiment that the mucous surface of the stomach and bowels is a medium for the elimination of poisons; and, unless this fact is borne in mind by medical witnesses, the greatest errors may be committed, and innocent persons condemned on erroneous charges. In the number of these 'Reports' for October, 1860 (3rd series,

vol. vi, p. 398,) will be found a record of the results of some experiments performed by Dr. Pavy and myself, in reference to the transference of poisons by absorption. The facts there stated clearly show that both arsenic and antimony may find their way into the mucous fluids of the stomach and intestines from the blood, and that the metals may be found in these organs although they have not been administered or taken by the mouth. In such cases the poison is found only in traces, without admixture of blood, flakes of mucus, or false membrane, such as are found in acute poisoning with arsenic. In reference to cases of chronic poisoning in small doses, the diagnosis is not so easy, and traces only of arsenic might be found under similar circumstances in the fluids of the stomach and bowels. Chemical evidence alone would not suffice to solve the question. A medical jurist must here look to symptoms and the general history of a case to enable him to come to a correct conclusion. In chronic poisoning by arsenic, gastric and alvine irritation, manifested by vomiting, purging and pain after each repetition of the dose of poison, will be present; and the occurrence of these symptoms with the detection of arsenic in the stomach and bowels would at once point to administration by the mouth. Such symptoms were absent in the case of the girl Bootman, and those which were really observed, were only in accordance with the effects of arsenic operating by absorption through the skin. The symptoms may be of a more severe character than those above described; still, unless arsenic, either in substance or in very large quantity, is found in the contents of the stomach and bowels, they may be considered as consistent with poisoning by external application. Among the early instances of life being destroyed by arsenic under these circumstances I may refer to the following, which occurred before it had been de-monstrated that arsenic was absorbed into the blood, and deposited in the organs of the body. On the 15th November, 1827, M. Fristo was required to examine the bodies of two children who had died suddenly. Externally, some ecchy-moses were apparent in the bodies, but the heads of both pre-sented large ulcerated surfaces, covered with a greasy matter of a yellowish-red colour. The mother informed him that on the 12th November a person had undertaken to cure her three

children of tinea capitis, with which they were affected.   She
allowed him to apply an ointment, and some hours after the
application the children suffered from convulsions and severe
pain in the bowels.   The youngest of the three died after
violent vomiting and convulsions.   The two others, a girl
æt. 11, and a boy æt. 9, died with similar symptoms on the
14th, two days after the application.   The principal post-
mortem appearances in the girl were infiltration and thick-
ening of the cellular tissue of the scalp ; the membranes and
substance of the brain were much injected, and serum was
effused in the ventricles.   The stomach was inflamed and pre-
sented ecchymosed patches, and a similar appearance was met
with in the duodenum and other parts of the small intestines.
In the boy the appearances were similar.   M. Fristo examined
a portion of the scalp, and separated from it a quantity of
arsenious acid in powder.   ('Annales d'Hygiène,' 1830,
vol. ii, p. 441.)   There was no doubt that the deaths of these
children were caused by the application of arsenic in the
ointment to an ulcerated surface of skin.   No attempt was
made to trace the poison to the tissues.

   Dr. M'Cready, of New York, met with a case in which a
child two years of age, affected with porrigo favosa, died
from the effects of the external application of arsenic.   A
woman mixed half an ounce of arsenic with gin, and rubbed
this mixture well into the heads of several of her children
affected with this disease.   It was followed by redness and
swelling of the face.   In the child above mentioned it pro-
duced diarrhœa and tenesmus, with paralysis of the lower
extremities, but no signs of local inflammation.   ('American
Journal of Medical Sciences,' 1851, p. 259.)

   A trial took place at the Chester Assizes in 1844, in which
a man, pretending to cure cancer, was charged with the death
of a female, by the application of an arsenical plaster, as it
was alleged, to the breast.   The woman died in a fortnight.
No satisfactory evidence was obtained of the symptoms during
life, except that there had been vomiting, and the accused
had taken care to remove and destroy the plaster so soon as
serious symptoms began to appear ; hence there was no direct
chemical evidence of the nature of the substance which he
employed.   Dr. Brett, of Liverpool, detected absorbed arsenic

in the substance of the stomach, liver, and spleen; the whole quantity detected was less than a quarter of a grain. The gullet, stomach, and intestines, were found extensively inflamed. In January, 1845, a man died apparently from the effects of arsenic absorbed through the skin of the arm. He was engaged in the manufacture of candles, to which arsenic was added in large proportion, and it was supposed that an abrasion of the skin had facilitated the absorption of the poison. The medical opinion given at the inquest was decidedly that the deceased had died from the effects of arsenic thus introduced into the system.

M. Flandin states that on one occasion he examined the viscera of a woman who had been killed by the application of an arsenical powder for the cure of a scirrhous breast. The arsenic (absorbed) was discovered in various parts of the body, but especially in the liver, which contained as much as is usually found when the poison has been swallowed. The quantity was greater than that separated from all the other organs together. This case presents many points of interest. The poison did not begin to produce its well-marked effects until after the lapse of about ten hours. Death took place in about six days, and the urine was suppressed throughout. The mucous membrane of the stomach and intestines was in its natural state; in the duodenum it was slightly swollen or thickened. (Flandin, i, 502.) In another case of a similar kind he found the arsenic only in the breast to which the ointment had been applied. The powder used by quacks as an application to scirrhous breasts is commonly a compound of arsenious acid, realgar (red arsenic), and oxide of iron. In this instance it was formed of seventy-five parts of the first-mentioned substance and twenty-five parts of a mixture of the last two. The quack stated that he did not apply more than four or five grains.

Cancer-quacks have furnished the greater proportion of the experience which we have regarding poisoning by arsenic applied to diseased surfaces. The following cases have fallen under the notice of MM. Bayard and Chevallier :—In November 1844, a lady consulted a physician respecting a tumour, about the size of a hen's egg, in her right breast. An operation for its removal was recommended, but she declined

this advice, ánd nothing more was heard of her until the 28th November, when it was found that she was labouring under symptoms of poisoning with arsenic. It seems that on the 22nd of November a man professing to cure cancer made several incisions in her right breast, and introduced into these a reddish-coloured powder, the parts being subsequently covered with an adhesive plaster.

In a few hours the patient had a shivering fit, and felt generally unwell. At night severe febrile symptoms set in, with copious and frequent vomiting of a greenish-coloured bilious liquid. On the 23rd the vomiting continued, bloody stools were passed, the febrile symptoms were unabated, and there was a tendency to drowsiness. These symptoms continued more or less until the 28th, when there was difficulty of breathing, great prostration of strength, pain in the chest, throat, and abdomen, with delirium. The eyes were strongly injected, and there was disturbed vision. The vomiting had ceased, there was no purging, and the abdomen was not painful on pressure. The intellect was not always clear. On the 29th she passed a restless night; there was no vomiting, but much purging of liquid stools. The pulse was 132, and small. Petechial spots appeared over the skin of the trunk and thighs. Very little urine was passed, and there was no perspiration. She died at 6 p.m., *seven days* after the application of the powder to the breast. The nature of this powder was not then known.

The urine passed on the 29th was analysed by M. Flandin, but he obtained only very doubtful traces of the presence of arsenic. On inspection there was no appearance of acute inflammation in the stomach and bowels. The mucous membrane of the large intestines alone presented an inflammatory redness. The liver, spleen, pancreas, and kidneys, were congested. The heart was soft and flabby. There was an ecchymosed appearance in the tissue of the right ventricle, and the lining membrane was very red and friable, an appearance which has been since observed by Dr. Wilks in a case of acute arsenical poisoning. The blood was liquid and black. On the whole, there were no appearances in the body sufficient to account for rapid death with the symptoms observed and described.

A *chemical analysis* was made by MM. Chevallier, Ollivier, and Flandin. Arsenic was detected by Marsh's process in three ounces of the diseased breast. Two separate analyses of the liver were made, the one of about three ounces and the other of about a pound, but no arsenic was detected in this organ. Six ounces of the fæcal matter in the intestines yielded no arsenic, and the same negative results were obtained from six ounces of urine, a pound of blood, four ounces of the kidney, two ounces of the lungs, and from eight ounces of the stomach and intestines. A portion of the red powder applied to the breast was examined and found to contain 75 per cent. of arsenious acid, and in the substance of the plaster which had been applied to the breast, arsenic was detected. ('Annales d'Hygiène,' 1846, vol. ii, p. 131.)

The remarkable feature of this analysis is the total absence of any evidence of the absorption and deposition of arsenic in the tissues. A quantity of the poison must have been used in order that any should have been found in the breast after the lapse of seven days; but this period of time would not account for its entire removal by elimination, even supposing that no arsenic had remained in the breast. The skill of the operators cannot be questioned, for they are well known as experienced experts; but it is probable that the process which they pursued—the method of carbonization by sulphuric acid—is not well adapted to the detection of minute traces of this poison in the organs. Even the urine examined on the day of her death by M. Flandin, gave no certain indications of the presence of arsenic, a fact which would lead to the conclusion that the poison was neither eliminated nor deposited; yet it is clear that it must have been absorbed, or the woman would not have died. In contrasting the results obtained by Dr. Brett, it will be perceived that, although in Dr. Brett's case the woman did not die until a fortnight after the application of the plaster, arsenic was found in the liver, spleen, and substance of the stomach.

MM. Bayard and Chevallier have reported another case which proved fatal in *five* days, in which an arsenical plaster had been applied to the breast of a woman. It seems that in this case no symptoms appeared until after the lapse of twelve hours. The patient then suffered from nausea, vomiting,

and bloody stools. These were followed on the next day by a
burning heat in the throat, great thirst, and delirium. The
symptoms continued more or less for five days, when the patient
died. The affair was kept concealed, and the body was buried,
but, from some rumour respecting the death, it was exhumed
nineteen days after interment. No other history of symptoms
could be obtained than that above given, as the deceased was
not attended by a medical man. The inspection of the body was
made under some disadvantages, but the principal appearances
found were as follows:—The cavities of the heart contained
dark-coloured blood; the heart itself was healthy, and the
lining membrane natural. The liver, spleen, and kidneys, pre-
sented nothing unusual. On removing the intestines, there
was a perforation of the jejunum, from which a lumbricus
escaped. The stomach contained a bilious mucus. The mucous
membrane was quite natural, and presented no appearance of
inflammation. The lining membrane of the duodenum had a
reddish tint, and the mucous fluid which covered it was
slightly tinged with blood. The other portions of the intes-
tinal canal had undergone no change. A part of the breast to
which the plaster had been applied was removed.

The *analysis* was made by MM. Flandin, Bayard, and
Chevallier, with the following results:—Two and a half ounces
of the diseased breast, examined by Marsh's process, yielded
arsenic. The linen rags which covered the breast contained
arsenic. The liver was examined by the processes of Marsh
and Reinsch, and arsenic was detected in each experiment. The
heart, spleen, and kidneys, gave similar results. Other
analyses were also made of the duodenum and a portion of
the jejunum, of the stomach and its contents, of the liquid of
the pericardium, the liquid of the abdomen, and the blood taken
from the heart and large blood-vessels. These different liquids
gave metallic deposits resembling those of arsenic, but too
minute for a verification of their arsenical nature. A portion
of the plaster which had been applied to the breast was tested,
and arsenic was obtained from it. The powder which had
been spread on the plaster, was found to be a mixture of
arsenious acid, sulphide of arsenic, and red oxide of iron.

From these results, taken in connection with the symptoms
under which deceased died, five days after the application of

the plaster to the breast, the reporters came to the conclusion that she had died from the effects of arsenic absorbed into the system.   ('Annales d'Hygiène,' 1864, vol. ii, p. 152.)

These two cases present singular pathological and chemical differences.   In the first the symptoms came on early, and were of a very severe character, the arsenic having been applied to wounds made in the breast.   Death did not take place until the seventh day, and, although the poison was most favorably placed for absorption, no absorbed poison was detected in the dead body.   In the second case the plaster was applied over a comparatively small surface, which had been previously scarified.   There were no symptoms for twelve hours, they then continued unabated until the fifth day, when death took place. On analysis absorbed arsenic was found in all the organs, and even traces, as if from mucous elimination, in the stomach and intestines.   The first case must be regarded as completely exceptional in its results.   As a rule, we may always expect to find in a case in which arsenic has destroyed life by absorption through the diseased or wounded skin, some portion of the poison, however small, in one or more of the organs.   The case of Bootman, which has been here reported and made the basis of these observations, will show that, even when arsenic is detected in the mucous fluids of the alimentary canal, due allowance must be made for its being a mere result of mucous elimination. Unless other circumstances are strongly adverse to this conclusion, a practitioner will not be justified in regarding the presence of *traces* of poison in the stomach, as a necessary proof of the introduction of the poison by the mouth.

ON

THE GLANDULAR NATURE

OF

PROLIFEROUS DISEASE OF THE OVARY,

WITH

REMARKS ON PROLIFEROUS CYSTS.

By J. BRAXTON HICKS, M.D. Lond., F.R.S., F.L.S., &c.

About two years since, whilst observing the structure of ovarian cysts, I had an opportunity of examining a fresh specimen of that form which has been called the "proliferous cysts of the ovary," and was much struck with the similarity of its microscopical appearance to that of another so-called instance of proliferous cyst, namely, *Adenocele of the Breast.* As this had not been noticed before, I took drawings at the time, and compared it with the specimens preserved in Guy's Hospital Museum. I also again compared it with fresh adenocele. I called the attention of some of my colleagues interested in the matter to the fact; after which I waited for another opportunity of examining a fresh specimen, for the preservation of these structures in spirit, &c., renders the appearance somewhat different, and the examination more difficult and unsatisfactory.

It was therefore with much satisfaction I read that Mr. Spencer Wells, in May, 1863, had described before the Pathological Society, the glandular structure of an ovarian cyst, under the name of "Adenoma." The specimen, of which he exhibited microscopical sections, was perhaps somewhat dif-

ferent from the specimens I am about to describe, but it pro-
bably differs no more from them than any two specimens, or
parts of specimens, do from one another.

The drawings I had made were shown at the next meeting
of the Pathological Society by my colleague, Dr. Wilks, to
whom I had originally described what I had noticed.

When the typical instance of this form of growth had been
shown to be essentially of an erratic gland structure, it is some-
what remarkable that the other notable example, that of the
ovary, was not minutely examined, with a view to the discovery
of similar structures in it.   It is also remarkable that mammary
disease having been proved to be really not cyst-growth, but
gland-growth, and not therefore answering to the definition of
proliferous cyst-growth, that both without hesitation should
have been retained under the old term.   The propriety of the
retention of the group " proliferous cyst" at all seems to be
very questionable, at least in the manner hitherto used, and
with its present members ; and the importance of reconsidera-
tion is the greater, since in the latest edition of his work[1] Mr.
Paget has classified another disease, of a totally dissimilar
character, under the same head ; I refer to " hydatiniform
degeneration of the chorion ;" for a careful study of this dis-
ease leads me to the same conclusion as that adopted by Dr.
Graily Hewitt ;[2] namely, that the cysts are not multiplied as
cysts, one from another, but that they are formed in the
already existing chorion villi, which become in part enor-
mously dilated, but probably do not normally nor abnormally
grow after the commencement of the change ; the dilatation
itself being sufficient explanation of the great increase in
length they undergo.   But even should it be proved that
cysts do sprout from the larger cysts, it would merely show
that the villi, even so changed, had not lost the power of growth,
and that their branches, even as they grew, became degenerated
into cysts.   A careful examination, however, of the mode by
which this distension is effected will show that it is by the
growth of cells within that they become distended ; it is only
when these undergo fatty solution that the contents become
more or less fluid and serous.   The whole process is a dis-

[1] ' Surgical Pathology,' 1863.
[2] ' Obst. Trans.,' vols. i and ii.

tension by the abnormal growth of cells within of a structure already formed; and therefore the idea of "proliferous cyst" does not seem to me to be contained in the "hydatiniform disease of the chorion." Be this as it may, there can be no doubt that dissimilar formations, here mentioned, are classified under the same head, and the term appears to be applicable to neither.

To recur to the subject of this communication :—If a fresh portion of the "proliferous cyst of the ovary" be examined by the naked eye, it will be seen to have such a resemblance to adenocele of the breast, that it will be impossible to distinguish them; indeed I have seen those well acquainted with adenocele unable to distinguish between two specimens. It will not be needful here to dwell upon the general appearance of the growths, further than to say that the cystic portion (from which they have derived their name) is rather the result of an accidental circumstance than of an essential condition. In other words, that an adenocele may exist without any cysts whatever. The gland-like elements crowd upon themselves so closely, being held down by fascia derived from the connective tissue, so firmly, in some instances, that a dense mass, a solid tumour, is produced. The same may be found in that of the ovary, in the solid forms of "adenoma," by making a section, or by carefully unravelling it under the microscope. It is, however, when the fascial envelope is separated from the gland-like portion by serum, that the true follicular nature of these growths are best shown (Pl. I, figs. 1-3). Indeed, they appear as enlarged representations of the drawings of dermic follicles found in text-books. They are essentially distinct from the villous growths found in the mucous membrane of the bladder, and on cervix uteri, or the mucous membrane of the intestines, &c. The true normal villus, and also the villus-like structures, are essentially a loop of blood-vessels, with their capillaries running in the centre of the pedicle, and to these belong the villi of the chorion; but in the pedunculated growths in question the blood-vessels are on the exterior of the pedicle and lobules, covered by the epithelium only.

In the case of these growths, the pedicle is sometimes a pervious tube lined with the same epithelium by which the lobules are lined, but at the base, or part where it is con-

nected to the cyst, it is closed. Sometimes it is impervious throughout. The lobules and pedicles when pervious are lined with epithelium, the thickness of which varies with the different specimens. The most common and typical number, as far as I have been able to observe, is a single layer of tesselated cells, more or less hexagonal. When the lobules project into a cyst, then the lobule has a single layer on the outer surface. Of this epithelium, more hereafter.

In some instances, as in Pl. II, figs. 1, 2, the walls of the lobules are composed of more than one layer; in the instance here represented there were three. In some specimens the lobules seem filled with the lining layers, either attached or shed, or frequently undergoing fatty solution, rendering them and the pedicle opaque. This, it will be observed, is also the case in solid forms of adenocele; it is shown in the ovary in Pl. II, fig. 2, where the growths are seen springing from the wall of the cysts, solid at least for some period after their commencement (Pl. II, fig. 1, *b, b*). No doubt many that thus spring up solid, lose this character in course of time, and after arriving at a certain size, their central cells cease to grow, and thus a cavity is formed, filled with fluid, which is either of a mucoid or serous character (Pl. II, fig. 2). In most cases this fluid, of whatever nature, contains cells in a state of fatty change (Pl. II, fig. 1, *c, c, c*), sometimes completely full, so as to be perfectly opaque; and as this occurs markedly in those lobules which have only one layer of epithelium, it may probably be fairly concluded that this is a species of secretion proper to the tissue, had it been formed under normal conditions, as the peduncles are not pervious to their terminations, the contents are consequently locked up, and remain, distending the lobule. Whether the growth of the lobule is ever owing to this pressure from within, causing it to form diverticula, as in some forms of polycystic ovaries, is uncertain. I am not aware of any specimen which seemed to encourage the supposition. Indeed the appearance of the bunch of lobules, situated as they are on the pedicle, are quite contrary to the notion, because they do not grow from one another but from a common stalk, after the manner of branching follicles (Pl. I, fig. 1).

If the cyst-wall from which these stalks arise be carefully

examined, they will be seen to be composed of more than one layer, as seen in the fig. If these be carefully separated, the point of attachment of the stalk will be readily noticed upon its outer surface. There is a small depression, but no aperture leads to the stalk. It would not be very difficult to suppose that the inner layer of the cyst represents the membrane, of whatever kind that might be, upon which the glands should have opened had they been formed naturally. The cyst, then, into which these pedunculated glands protrude would not be the original Graafian, but one formed around the growth, which has filled up the Graafian by its increase and become adherent to it, while the wall of the Graafian is represented by the outer layers. This will be alluded to again later on.

In those instances where, from the different stages of growth, there could be little doubt as to the nature of the process, I have found that the secondary growths began in the following manner. On the wall of the lobule, amongst the epithelium, one could see a cell larger than the rest, extending beyond their line. But the very origin of this cell it was difficult to make out; namely, whether it was an enlarged epithelium-cell, or whether it sprang from the layer beneath protruding through the epithelium. However this may be, this large cell, easily recognised, with large nucleus (Pl. II, fig. 1, *b,b*), divided first into two, then into many more, attaining thereby a proportionate size; after it had attained the diameter of six or more cells a cavity appeared, which increased with the growth of the mass, the number, from exterior to interior, of cells remaining apparently pretty constant, or, in other words, the number of cells composing the thickness of the walls remains the same. A recently formed lobule is seen at Pl. II, fig. 2. The cells probably form towards the interior, and by their decay give rise to the pseudo-fatty secretion above alluded to. The gradual growth of these lobules may be seen at Pl. II, fig. 1, *b, b, b.*

A number of these abnormal formations may be seen in one group of the same size, as at Pl. II, fig. 3. Not, indeed, quite after the same fashion, but evidently to be included under the same erratic form to which the whole belongs. The arrangement of the cells forming the thickness of the smaller cysts is well seen by crushing one under the microscope, the field of which is seen filled with

groups of cells adhering end to end two or three deep, as may be seen at Pl. II, fig. 4. The epithelium on the exterior of these growths is somewhat remarkable. That of the cyst in which they are found is, I believe, invariably of the tesselated type. I am not certain if it can be said that in *all* instances these growths projecting into it are never covered with this, but in every one of the specimens I have been able to examine, both of the recent kinds and of those preserved in the museum of Guy's Hospital, I have found the *columnar* present (Pl. II, fig. 1, *a*). The majority have the *non*-ciliated variety, but in some, which have departed from the ordinary type above described, ciliated epithelium has been clearly observed in prodigious quantity. In what respects these forms differ from the non-ciliated it does not very clearly appear, but I have observed that the growths on which they are placed generally do not follow the glandular structure very closely. The epithelium is easily rubbed off, and if care be not taken it may escape observation, but generally a quantity may be found floating in the contents of the cyst. This is particularly noticeable when the growth approaches more or less to a malignant type, and was extraordinary in the specimen at Pl. III, fig. 2, *d, d.* The cilia are there shown remaining *in situ.*

The above remarks apply to the more ordinary forms of these growths, which in their greatest development are called proliferous cysts, while in their smaller they pass under the name of pedunculated growths. This latter term is very indefinite, and includes doubtless more than one kind. But yet there is in some, much which follows the type above described, and one is led to suspect that they are another form or variation of erratic growth, perhaps, after the glandular type. In some forms of malignant disease of ovaries, and of other organs, there is a tendency to the pedunculated or villous form of growth, which assumes the appearance of the forms now under discussion ; but in the specimen I have here brought forward (Pl. III, figs. 1, 2), there was no evidence of true malignant structure. It is a curious fact that, although in its microscopical appearance there was nothing that could be called malignant, yet the behaviour of the growth was not unlike it, in forming adhesions all round, and in the tendency of the pedunculated growths to extend into the other cells through their walls.

The tendency to form cysts or cavities in the growth itself was much less noticeable in this specimen than in others. The lobules were composed of a variable number of large cells, with a nucleus in each (Pl. III, fig. 1, *b, b* ; fig. 2, *b, b*), the contents being perfectly transparent and colourless. The peduncles were composed of large fibrous cells, not densely crowded, but irregularly interspersed (although always parallel to the exterior outline) among cells and nuclei (fig. 1, *c, c*; fig. 2, *c, c*). The external layers of the peduncles were always composed of large cells with nuclei; as in the lobules, their variable position and size gave a very irregular outline to the peduncle. The fibrous tissues above alluded to varied in size, but were precisely like those of the uterus ; many, if not most, were undistinguishable from those of the pregnant uterus, both as to size and form.

In *no* part of the whole disease was one able to find an instance of a *bi-* or *polynucleated cell.* As above observed, the surface of all was covered with columnar epithelium, of very variable size, but all ciliated. These had been shed in such numbers that the contents of the cyst, into which the mass protruded, was densely opaque from their presence, looking to the naked eye like a cyst full of pus.

The secondary and tertiary cysts were formed from the round cells on the exterior of the primary and secondary : one cell near the outside growing to a considerable size, projected from the surface, and then became more or less pedunculated ; this after a time (at least, so one supposed by comparison with various stages of the growths) multiplied in it, and thus it increased in size. How these ultimately became covered with epithelium no evidence appeared; probably in the same manner as in other parts, where it has been shed.

Now, there was much in this which corresponds with the case described by Dr. Bristowe in 'Path. Trans.,' vol. iii, p. 404, both in its general description and microscopical characters, with the exception that in his case binucleated cells were numerous, whilst in this there were none. This is important, because, whereas in that case there were secondary malignant deposits, in this there were none whatever. There can be no doubt that upon these structures so-called malignant disease can be superadded, or may spring up with its growth, and that this superaddition may vary both in

intensity and in kind, according to the laws of aberrant growth which govern these formations, and this will go far to explain the varied character of these growths, as regards both microscopical appearances and also as regards their tendencies. It will explain what otherwise is inexplicable—how in some forms we have simple structures, in others some features of a malignant habit, yet simple in their elements, while in others the structures gradually run into what is considered essentially malignant.

The more the aberrations of normal growth are examined, the more they show how impossible it is to define malignant disease strictly. The well-pronounced disease can generally be recognised, at least by taking its many characters in common; but in the numerous intermediate states (and they are more numerous than they have hitherto been thought) there seems no means of distinguishing them. That they may be grouped is possible, but the groups will be formed by characters drawn rather from the particular element so affected than from the knowledge of the exact nature of the change whereby they differ from normal structure or from each other.

The various names used to distinguish these groups is sufficient proof of this, and, if more were required, the ambiguous nature of the definitions attempted. Let it at once be acknowledged that between excess of growth after the normal type and the various well-pronounced forms of malignant disease there are numerous degrees, not only in kind, but in grade, and instantly the difficulty ceases. To those who *will* have precision, this will not commend itself; but as there is really no such strictness in nature, the task imposed is severe.

But to pass to the consideration of the simple glandular pedunculated growths. What is their nature, and whence do they arise?

The difficulty of the subject is great. Are these pedunculated " proliferous" growths derived from the substance of the ovary itself, the stroma; from the wall of the Graafian follicle; or, thirdly, from the ovum? From one of these, it seems, they must be derived.

Again, if we admit them to be of a glandular nature, are they the same as the solid form called by Mr. Spencer Wells adenoma? From my own observations I cannot think but

that they are identical. For in adenocele of the breast one cannot have any hesitation in declaring at once that the pedunculated varieties are one with the solid; they occur together, their structure is the same; the only point of difference being that one is compressed by its own growth, while the other is free to expand.

Dr. Wilson Fox has latterly ('Proceed. Med. Chir.,' p. 373, 1864) examined ovarian cysts particularly in relation to the adenomatous variety. In the conclousions he forms he differs somewhat from those I have been led to by the examination of numerous specimens which have presented themselves to me. In regard to the formation of the glandular tubules, we differ in this respect, that whereas he considers the tube, afterwards the cyst, formed by the growth of the stroma around it (should it not be the connective tissue of the wall of the Graafian follicle?), as the gland itself, I believe the projecting so-called villous growth which springs from the cyst-wall is the true glandular structure, the interior of it lined with epithelium representing the cavities of an ordinary follicle. In this it coincides with the mode of growth in adenocele. Of the origin of dedritic growths he gives no explanation, but it will be seen from the above remarks that I consider them allied to the proliferous and adenoid varieties, varying, perhaps, rather in degree than in kind.

It seems, however, premature for us to arrive at any final conclusion at present; the subject is more or less new, at least, viewed in the light of glandular structures; and this I say after examination of numerous specimens of diseases of ovaries, because it is possible that we may hereafter have to separate some forms now supposed similar. A source of difficulty arises in the first stage of our researches, and that is, the impossibility of distinguishing the epithelium lining the Graafian follicle, of whatever size, from the simple epithelium of the glandular " adenomatous " growths. Another point is also of great importance, I may almost say essential, in the examination of these tissues, which is, that they should be examined fresh, before treating them with preservative or hardening structures; the more particularly as it is as necessary to unravel the tissue as to make sections of it. A third difficulty is that the smaller Graafian follicles when mutually compressed become

altered much from their original configuration, so that when a section of a mass thus compressed is examined, it very much assumes the appearance of being tubular. Thus it may be quite possible that some forms will have to be separated from the more decided adenoma.

There is one point which seems to throw light upon the subject. We know that ovarian cysts are occasionally found having dermic tissues developed upon their walls, forming what is called a piliferous or dentiferous cyst, in which the mass of dermic tissue springs from one point of the cyst. That this mass must have originated from an ovum is clear; and it is equally clear that the stimulus to the growth must have arisen from either, first, direct impregnation, the ovum remaining in the Graafian follicle; or secondly, an impetus derived from the paternal impregnation, or as it is called, metagenesis, or dia-genesis, or parthenogenesis; or thirdly, from an inherent tendency in an ovum to grow towards the production of a fœtus under a stimulus, not of sexual character.

From researches on the point, into which it is not necessary now to enter, it seems that the second cause is the most likely; in any case, many kinds of tissues have been found, even the neural. Follicular structures are very common, and they give rise to the large quantity of fat found in the cysts.

. In one of the specimens in the Hunterian Museum, one cyst contains teeth, while the adjoining one has a mass of pedunculated cysts (pendulous glands).

For myself, I am inclined to consider all these growths that spring from the wall of the Graafian follicles as having their origin in an ovum, which departing from its usual quescent condition, is stimulated to grow, after the manner of these Dermic tissues in the above-mentioned cysts. It seems not at all improbable that one of the Graafian follicles becomes filled early with the glandular mass, which continues to grow, behaves in all respects after the mode well-known in adenocle, and thus form the solid variety called by Mr. Spencer Wells, " adenoma."

The springing of the mass of growths from the one point of the wall of the Graafian follicle also tends to show its ovular origin. It must be remembered that these structures are by no means common, although not quite so rare as might be

supposed from the omission of all former notice of them by
authors.

The occurrence of columnar, and especially of ciliated
epithelium, also points to an origin diverse from the simple
Graafian follicle.   That ciliated epithelium is not very uncom-
mon in these growths is to be learnt from the case above de-
scribed ; from Dr. Bristowe's case above alluded to ; and from
another recited by Dr. Wilks in 'Path. Trans.,' vol. vii,
p. 281.

It is possible that these ciliated forms have an origin in an
entirely different tissue from the simple proliferous growths.

I have observed another form of pedunculated growth,
which seems not to belong to the foregoing.   They are slightly
coloured pink, but nearly translucent, and are composed of
connective tissue.   But instead of its being of a compact
dense character, the fibres are separated into loops by the in-
terposition of a firm but perfectly colourless and transparent
inter-cellular substance, so as to form small lobulated masses
springing from the cyst-wall.

Case 1.—*Description of the growth on ovarian cyst-wall.*

Specimen shown at Plate 2, mentioned at page 241.

Numerous patches of outgrowths from internal surface of
the cyst.   Some very small, as merely to give a velvety ap-
pearance to the surface, others larger, forming pedunculated
branching masses, varying from a minute size to one inch and
a half long.   The branches were more or less clavate ; the
secondary and tertiary springing from the surface of the parent
in all stages of growth.

The smaller and latest found were solid, others contained in
their centre dark, opaque matter, which was shown to be flat
globules and cells, after bursting it open.   Some of the larger
were distended into small cysts, none exceeding the size of a
pea ; many were very small.   The fluid within was like mucus,
and contained the fluid fat-cells dispersed within, and globules
with the cells forming lining of the cysts (glandular epithelium ?)
and small granular degenerating nuclei.

The whole of these structures were very vascular.   The
vessels could be seen running in the walls of the growths, but

were not within the cysts, but rather on the exterior just beneath the layer of epithelium.

Microscopical appearance.—The whole of the growths excepting the younger was covered with columnar epithelium ; I could not detect ciliæ. It is possible they were present, but not easily discernible. The length of the columnar epithelium was $\frac{1}{1000}$th of an inch. These were readily seen *in situ*, and also detached, frequently in large masses.

The clavate lobules, primary and secondary, possessed a remarkable resemblance to adenocele. The walls were composed, on the average, of the depth of three cells, end to end, more or less wedge-shaped like the bricks of an arch. These wedge-shaped cells could be readily observed separate, by compressing one of the lobules. The nuclei of them all were large and single.

The tertiary, or those in state of formation and growth, were to be seen springing singly, or in clusters, from the surface of the secondaries, in all stages of development, without epithelium. They originated as a single cell, four or five times larger than the epithelium. The more advanced possessed cells proportionate to their size, probably from the division of the single commencing cells. However, this is an open question, as I could not see any transitional state of cell division.

The component cells were large, with large single nuclei. From comparison of the various examples in different stages, it appeared that, first of all, a cell was formed on the surface of lobule (how, it was not clear), that by subdivision and growth of this a lobule was formed, till a solid mass was formed ; that when its mass contained enough cells to form a wall, having cells three or four deep, the centre in course of growth became hollow, because of cessation of growth in that direction. That the space so found was filled with mucoid fluid, but that probably before that, at any rate coincident with it, the fat cells, or fatty globules from fatty degeneration were poured out from within in the same manner as the sebaceous follicles and mammary glands (fat secretion). The fat certainly at first predominated and rendered opaque the various lobules, while the larger were more like cysts, the mucoid secretion being apparently poured out at a later period.

SPECIMEN 2.—*Examination of the ovary,* illustrated in Plate
   III, described at page 242.

All the organs in pelvis and lower abdomen firmly adherent
—a large collection of pus extended from uterus up to the
liver—forming the bulk of tumour felt before death. It was
apparently situate in the cellular tissue, but the parts were so
fused together as to render it difficult to clearly trace all the
tissues. The uterus was imbedded in a mass of dense ad-
hesions; these after careful unravelling were seen to enclose
both ovaries, which were firmly united to the side of the uterus.
Both ovaries were the size of a fist, composed of many cysts of
various sizes, from the size of an orange to a walnut. The
walls were cartilaginous, and in places ossified. The contents
varied much. In some a cheesy matter was found, which was said
not to be composed of fat. (It was unfortunately not examined
by any one versed in the matter.) On the wall the largest cyst
on right side, extending over more than half the surface, a dense
mass of low projection, resembling the villous or cauliflower
disease of the cervix uteri, composed of pendulous branching
growths, at first sight also like the so-called proliferous pendu-
lous cysts of the ovaries. It was covered with a creamy fluid-
like pus to the eye. This appearance was owing, however, to in-
numerable cells of ciliated columnar epithelium, which had been
washed off from the villoid pendulous growths. These latter,
when carefully examined, were enclosed by a delicate basement
membrane; within the contents varied, having large round cells,
containing nuclei interspersed without regularity of position,
with fibre-cells lying in various directions, and at varying
distances. However, the stems of the branches contained
fibre-cells in parallel directions, but the size of all varied much,
some as delicate as possible, others as large as fully developed
uterine muscular tissue of pregnancy, from which they could
not be distinguished. Amongst these were rounded cells in-
terspersed, the surfaces of the larger lobules were sub-lobulated,
and a cell was generally found within these smaller lobules.
On the surface of all were frequently to be seen small lobules
forming and becoming pendulous, with only one cell in each.
In no part was there to be found any cell with more than one
nucleus, which varied considerably in size. There was no
trace of blood-vessels or capillaries within. Had there been I

think it must have been visible, from the ease with which the interior could be seen through. A few of the same growths was observed on spots of a cyst in the ovary.

As to the adhesions, the history of the case showed that four years ago she was under me with cellulitis on left side, from which she recovered; and that three months before death she was attacked with acute inflammation in right side, since which she had gradually enlarged in that side. This swelling was also considered to be of cellulitic origin, and the swelling owing to a collection of pus. The *post-mortem* examination showed that the disease of the ovaries had given rise to the pus. There was no disease in any other organs, nor any evidence of the adhesions being malignant.

DESCRIPTION OF PLATE I.

Fig. 1. Section of cyst-wall of three layers; to the inner one the pedunculated growths are attached, here shown of different shapes.

Fig. 2. Secondary growths, enclosed in a cyst which has been opened.

Fig. 3. Shows epithelial layer in section. On one lobule they are shown as *in situ*. (*a*) Enlarged view of epithelium seen from above.

Fig. 4. Section of lobule of adenocele, showing epithelium *in situ*. (*a*) Epithelium enlarged, seen from above.

Fig. 5. Commencement of a growth springing from lining of Graafian follicle, after immersion in spirits.

Fig. 6. Structure of pedunculated growth composed of connective tissue. (*a*) Portion of same highly magnified, cellular origin well shown.

25 1

DESCRIPTION OF PLATE II.

Fig. 1. Section of portion of wall of a " proliferous cyst;"
wall composed of cells three deep, covered by
columnar epithelium (*a*). Secondary growths
(*b, b*) are forming on exterior cells in different
stages of fatty change (*c, c, c*), as seen among the
mucous contents.

Fig. 2. Section of younger cyst, composed of same
elements.

Fig. 3. Mass of secondary growths in about the same stage,
not yet possessing a cavity.

Fig. 4. Group of wedge-shaped cells from the cyst-wall.

Fig. 5. Appearance of a lobule of actively growing adeno-
cele viewed from the side. The epithelial cells
are elongated by mutual pressure instead of
tesselated. (*a*) Portion of same enlarged. Com-
pare this with fig. 2.

DESCRIPTION OF PLATE III.

Fig. 1. Pedunculated growth. (*a, a*) Secondary lobules in various stages, with columnar epithelium. (*b, b*) Component cells, with nuclei. (*c, c*) Fibrous cells.

Fig. 2. Older portion of pedunculated growth. (*a, a*) Secondary lobules. (*b, b, b*) Component cells, with nuclei. (*c, c*) Fibrous cells. (*d, d*) Ciliated epithelium *in situ*.

Fig. 3. Ciliated epithelium of various sizes. Non-ciliated specimen is shown for comparison.

Plate I.

Fig. 3.   Fig. 2.   Fig. I.

Fig. 3a.   4a.   Fig. 4.

Fig. 5.

Fig. 6.

6.a.

J B Hicks delt et sec   M.&N.Hanhart. Imp

Plate. II.

2 5 2

Fig. I.

b
b
b

a

c
c
c

Fig 3

Fig 2

Fig. 5.

Fig 4

5 a.

J H Hicks del et sec

M & N Hanhart Imp

Plate III

252.3

Fig 1

a

b

b

c

c

Fig 2

b

a

d

b

c

a

d
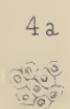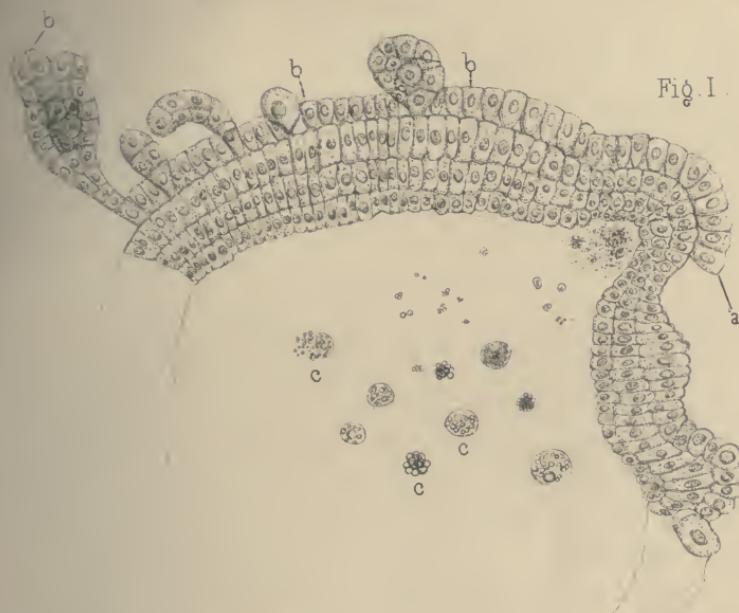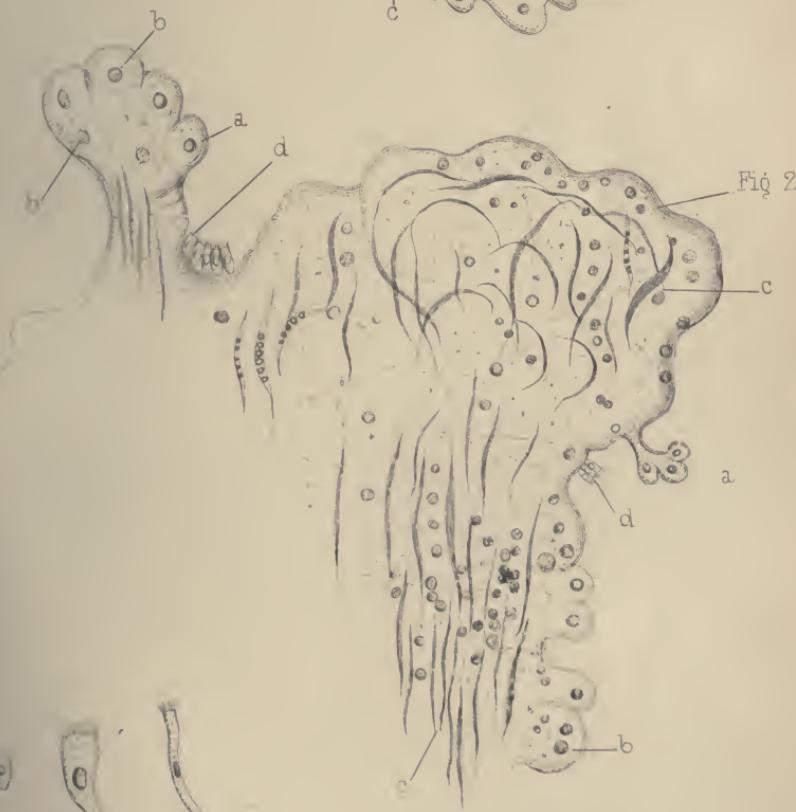
Fig 3
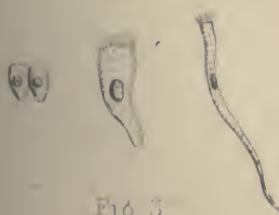
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DEATH FROM RUPTURE OF THE UTERUS.

INVERSION OF THE UTERUS, AND EXPULSION OF THE CHILD BY GASEOUS PUTREFACTION.

By ALFRED S. TAYLOR, M.D., F.R.S.

THE notes of the following singular case have been furnished to me by Mr. Edward Bedford and Mr. Alfred Roberts of Sydney, formerly pupils at this hospital. The inspection of the body was made by Mr. Bedford, and the report drawn up by him :

On the 3rd June, 1864, by direction of the coroner, Dr. Shaw and I made a post-mortem examination of the body of a woman aged 37 years, who had died on the 27th May previously, thirty-four miles from Sydney. She was at the time in labour of her seventh child, but she died undelivered. Her previous labours had been good. Two medical gentlemen had seen her during life, and after her death reports arose of want of care on the part of the first medical attendant, who was also the coroner for the district ; the Attorney-General, therefore, directed the body to be exhumed, and an inquest to be held in Sydney, where the woman had been buried. ·

From the evidence it appeared that on the 26th May she was attacked with shivering and a feeling of weakness ; she then became warm. She sent for a medical man who lived close to her house. She described her symptoms to him, and stated that she was near her time, and though she had pain in her head and chest, she had no labour pains. She was in a small room with a fire, and a quantity of blankets were over her. She was directed to have the fire put out, the blankets

removed, and as the bowels were not opened, a dose of castor-oil was ordered. Some time after, as this did not act, an enema was directed to be given. In a few hours she had another shivering fit, and her medical attendant visited her again. The woman then complained of thirst and flatulence, and still said she had no labour pains. The nurse said the waters had been discharged ; medicine was ordered to relieve the flatulence, cooling applications were directed to be applied to the head, and the medical attendant left the house. As his residence was near, and a midwife was in attendance, he did not feel it necessary to remain until pains set in. The medical man had not left many minutes before a violent pain came on, not only severe, but long. The nurse felt the head of the child very low down, and observed that it receded a good deal when the patient drew her breath, and after the pain had subsided. The woman suddenly became very weak, delirious, and died in rather more than half an hour from the time of this pain coming on. The nurse then sent for another medical gentleman, who, on his arrival, found the patient in a dying condition, the head of the child low down, and there were no pains. He gave gin and ergot, but these were not swallowed ; he sent for his instruments, but before they arrived the woman had died.

An inspection of the exhumed body was made about a week after death, and the following appearances were found. The body was well nourished, there was a good deal of decomposition, and from that cause the abdomen was much distended. The dead and decomposed body of a male child, which had arrived at its full time, was lying between the thighs of the deceased ; the head was towards the feet of the mother, and the feet underneath the uterus, which was inverted, and with the placenta attached to it was lying also between the thighs. The umbilical cord was not divided. On opening the abdomen a good deal of gas escaped ; there were about four pints of blood effused in the cavity of the peritoneum ; the hand could be passed between the bladder and rectum into a pouch which extended between the thighs. Towards the rectum there was found an opening. On replacing the uterus, which was not contracted, there was observed a rent through it and the peritoneum. The rupture of the uterus was at its posterior

part a little above the cervix; it was transverse and about six inches long.

The heart was flabby with much fat, the liver and right portion of the diaphragm were very soft. There was a small quantity of extravasated blood in the muscular structure. The left lung had at its apex tubercular deposit, and between the pleura and spine on that side, there was a small quantity of coagulated blood.

From these appearances, and from the general history of the case, the opinion given at the inquest was that death was caused by a rupture of the uterus. The loss of blood as a result of this rupture was so sudden and copious that the first symptoms gave no clue to the coming event; that the rupture and consequent hæmorrhage were necessarily fatal; and that no blame attached to the first medical attendant.

There are many points of interest in this case. 1. The rupture took place after one prolonged pain, without any previous symptoms that would lead to a suspicion of what was about to happen. 2. Though the rupture was large, yet the body of the child did not escape into the abdomen, no doubt owing to the fact that the child had been brought down very low by the prolonged pain which nearly passed it into the world. Rupture of the uterus then took place, and the child was too low down to recede to its original position.

The child was not expelled from the mother by any post-mortem contraction of the uterus, for that organ was not found contracted. The post-mortem passage of the child and inversion of the uterus, were, I consider, the result of the pressure of the gas arising from decomposition in the abdomen. In many cases, perhaps most, this organ contracts after rupture, as in rupture of the intestines the mucous membrane is generally everted; but in some severe lacerations from external violence I have seen the torn parts lie without any muscular action taking place in them, and although the person lived many hours, yet the contents of the bowels had not passed through the lacerated parts. In this case the violent action of the uterus may have produced a similar condition.

If the uterus was in this inactive state after the rupture and after systemic death, it would be lying like a piece of wash-

leather applied closely to the body of the child in its cavity; the gas from decomposition collecting in the abdomen, which was largely distended at the time of inspection, would gradually press upon the fundus and its contents. Under these circumstances the body of the child would be pushed forwards, followed by the closely attached uterus, which would thus become inverted. This would account for the position in which they were discovered. Had the child been born by the contraction of the uterus, this would have been observed before the body of the woman had been placed in the coffin. Whether the reasons here given are considered correct or not, the case is, so far as I am aware, quite novel, for I have nowhere seen recorded an instance of inversion of the uterus as a result of post-mortem changes.

[The effects of putrefaction on the development of gases in the cavities of the body, have been described by Orfila and other medico-legal writers. The protrusion of the eyes, the swelling of the tongue, the escape of mucous fluids by the mouth and nostrils,—or of blood from divided vessels leading to what has been called post-mortem hæmorrhage,— are conditions which have been noticed and recorded by those who have watched the stages of decomposition. The production of gases from the decomposition of the fluids, takes place in all the cavities of the body, but most rapidly and abundantly in the cavity of the peritoneum. Orfila states that he has noticed this particularly in those cases where persons have died suddenly from violent causes, death having been preceded by severe pain or strong muscular exertion. In such cases the body may become emphysematous in two or three hours, and be rendered so buoyant as to float readily upon water. ('Médecine Légale,' i, 656.) Some dead bodies pass into gaseous putrefaction with great rapidity. The Inspection books of this hospital will furnish instances of this kind.

A man, æt. 39, was admitted into Guy's Hospital in October, 1849. He was fat, of pale complexion and of intemperate habits. The muscles were flabby. He died suddenly after a few days, without suffering from any symptoms indicative of danger. His death took place at 10.30 p.m. The body remained in the ward until 8 a.m. the following morning, .

the air having a temperature of from 60° to 65°. The conditions as to cooling and rigidity were not observed during the night, but when removed at the hour mentioned, decomposition had already commenced. The skin on the left side was raised in large bladders, containing a bloody liquid. At 2.30 p.m., *i.e. sixteen* hours after death, the entire skin was more or less of a blue or purple colour ; the eyes protruded from the sockets, and the nostrils were filled with a bloody froth, from which minute bubbles of gas continually issued. The abdomen and scrotum were greatly distended with gas. The groins were much putrefied, and were covered with minute blood-vesicles. I saw the body *seventeen* hours after death. The skin of the neck and face had then a bloated and tense appearance, from the collection of gas beneath. Blue, green, and livid-red discolorations were seen more or less over the whole surface, with bladders or vesicles as in the advanced putrefaction of bodies after some days' exposure in hot weather. The gases which issued in jets from every part of the skin in which a puncture was made, were highly offensive. When a flame was applied to the puncture, the gas burnt suddenly with almost explosive violence. The gas did not discolour slips of paper moistened with acetate of lead or nitrate of silver : hence neither sulphuretted nor phosphuretted hydrogen was present. It burnt like the bright carburetted hydrogen ; and I believe that it was this gas, mixed with other gases and vapours derived from putrefaction. When the tense skin of the scrotum was punctured, a jet of carburetted hydrogen escaped, which burnt steadily, with a pale yellowish flame, for above a minute. The state of the body precluded a post-mortem examination, which was considered unnecessary.

I have published a full account of this case in the ' London Medical Gazette' for 1850, vol. 45, page 17. One somewhat similar was reported by Dr. Wilks in the 'Guy's Hospital Reports' for October, 1863, p. 181, and he has since communicated to me the following case :

A man, æt. 50, died in Guy's Hospital, from an accident in December, 1860. He lost much venous blood, and, without showing any sign of rallying from the accident, he sank on the fourth day after his admission. For a few hours before death he suffered from great difficulty of breathing, and his pulse

was not perceptible. The man died at 6 p.m., and in an hour or two his body was carried to the dead-house. The weather was frosty, and it was a hard frost during the night that the body lay in the dead-house. On the following day (only twenty hours after death) putrefaction had advanced to such a degree, that the deceased could scarcely be recognised. The skin was throughout distended by the gases of putrefaction. All the viscera were decomposed, the liver contained putrescent gases, and even the coats of the gall-bladder were distended with them. This was an instance of rapid death, probably from blood-poisoning.

In Mr. Bedford's case we get rid of any difficulty about the sufficiency of time after the death of the woman for the production of a large quantity of gas in the cavity of the abdomen. The question, therefore, simply arises whether the presence of the accumulated gas can suffice for the production of the phenomena described. The abdomen was much distended at the time of inspection, hence it is obvious that there was even then no free escape for the gases thus accumulated.

Medico-legal writers have described cases of delivery where the child has been expelled after the death of a pregnant woman, and in some few instances where this expulsion has taken place after putrefaction had commenced, and as a result of the process. One of the best authenticated of these occurred to Dr. Richter, of Weissenfels; it will be found reported in Casper's 'Vierteljahrschrift für gerichtl. und öffentl. Medicin,' vol. xix, p. 163. Berlin, 1861. A woman, æt. 45, had been married seven years, and during this time had aborted twice in the second, and once in the third month of gestation. In August, 1861, she returned home from field-work on a Monday evening, apparently well. About 8 p.m., she was seized with severe spasmodic pains in the region of the heart; these came on in fits every five or ten minutes. A nurse who attended her in her pregnant state, found on examination that the mouth of the uterus was quite closed, the neck only a quarter of an inch long, and the head of the child lying forwards. There had been no discharge of blood or of serous fluid, nor any appearance to indicate approaching labour. An enema was administered, and some time after this, another examination was made. Ther

had not been the least change, and the commencement of
parturition appeared as far off as ever. About midnight,
after a remission of two hours, the woman was suddenly
attacked with so severe a paroxysm of pain that she attempted
to jump out of bed. She was forcibly held back, and she
then lay still and quite unconscious until 5 a.m. on Tuesday
morning, when, after breathing slowly and stertorously, she
died. A medical man who had been sent for, only reached
the house after her death.

The dead body was washed and laid out in the usual way.
There was no appearance about the genital organs to attract
particular attention. The body was moved in the evening
into another room, and there it was frequently seen by the
nurse and other people of the house. Putrefaction set in
somewhat quickly ; and as there appeared to be some watery
discharge about the genitals, the thighs of the corpse were
slightly separated by the nurse. This examination was made
on Thursday evening, about sixty hours after death. On the
following morning, the fourth day after death, when arrange-
ments were made for placing the dead body in a coffin, there was
found lying between the thighs of the corpse, the dead body
of a child in a partially putrefied state. It was well deve-
loped, and at about the eighth month of gestation ; with it
were lying the umbilical cord and placenta. Some water had
flowed from the outlet, the body was livid, and the abdomen,
although smaller in size, was still distended with gas. Dr.
Richter truly observes that this case is remarkable, inasmuch
as the contents of the uterus had been expelled by the gases
of putrefaction, although labour had not previously commenced.
Still, the facts were of that character that nothing but phy-
sical forces could have been concerned in the expulsion of the
dead body of the child.

In many points this case resembles that described by Mr.
Bedford, but in his case there was the additional fact that
the uterus itself was lacerated and inverted, or turned inside
out. Such a state of parts might appear to indicate violent
manipulation, and expose a practitioner, as on that occasion, to
a charge of malapraxis. It was clear, however, from the testi-
mony of eye-witnesses, that the extrusion of the body
must have occurred after the deceased woman had been

placed in the coffin; and in Dr. Richter's case it is equally evident that the extrusion occurred on the fourth day after death and before burial, under circumstances which could admit of no mistake.

[It is obvious that a medical practitioner may be placed in great peril by an occurrence of this nature, unless the facts are known and can be deposed to by eye-witnesses. A woman might die undelivered during the attendance of a medical man. Her condition might be such as to justify the employment of instruments brought for the purpose, but not used, either from her sinking state or her sudden death. Under these circumstances, the discovery after death of a dead child between the legs of the female, with the uterus lacerated and inverted, the placenta and umbilical cord lying near, and a large effusion of blood in the abdomen, are facts which at first sight do not appear to be reconcilable with the effects of spontaneous changes in the dead body. There are probably some medical practitioners who, from not having before heard of such cases, would not hesitate to deny the possibility of their occurrence. It is to them that cases of this description convey a serious warning. Ocular evidence of the condition of the deceased woman may not be forthcoming when it is required to clear up an apparent mystery. It is, therefore, desirable to proceed with the caution shown by Mr. Bedford in the case which is the subject of this paper, and to take into consideration the remarkable effects occasionally arising from accidental circumstances. On this occasion the coroner of the district, himself a medical man, was the individual who was supposed to have maltreated this female. If the investigation had fallen into the hands of an ignorant person, he would have had some difficulty in placing himself right with the public. The utility of recording such cases is seen in the fact that they aid the development of truth in charges which involve the reputation of members of the profession. They also supply, for the purposes of medical evidence, and for the defence of medical opinions, facts which may never have come before a practitioner in his professional career.]

CASES OF INGUINAL HERNIA,

DEPENDING UPON ABNORMAL CONDITIONS

OF THE

VAGINAL PROCESS OF THE PERITONEUM.

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BY JOHN BIRKETT.

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ONE object of this paper is to group together a number of cases which have been under the observation of the writer, but which in an isolated and detached form might be regarded of little scientific value. Facts acquired by observation in the wards could not be placed before surgeons of large hospital experience on account of any intrinsic novelty ; but the student of surgery, and the younger members of the profession generally, may glean from them many valuable practical hints relating to the diagnostication and treatment of sometimes very obscure cases.

Another intention is to demonstrate the varieties of this kind of hernia, the anatomical characteristics of each, and the periods of life at which they are most commonly developed. The details of the cases show also the dangers to which persons are liable in whom these varieties of hernia are developed, as well as the difficulties which are encountered in their treatment.

We must first give a brief description of the vaginal process of the peritoneum. It is a prolongation of the parietal peritoneum of the abdomen into the scrotum. It is always found in early fœtal life ; but when it exists after birth it is to be regarded as an abnormal condition.

It was shown, rather more than a hundred years since, that a tubular prolongation of the peritoneal membrane extended into the scrotum of the fœtus, and that this tube, as Sharp[1]

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[1] 'A Critical Inquiry into the Present State of Surgery,' by S. Sharp. F.R.S., Surgeon to Guy's Hospital, 3rd edit., p. 5.

writes, becomes divided into two ; so much of it as invests the
cord is called the tunica vaginalis of the cord, and that which
contains the testicle the tunica vaginalis of the testicle.   He
had observed that a hernia sometimes touched the testis, and
explains the circumstance by assuming a rupture of the septum
between the tunicæ vaginales.   The Hunters [1] and Haller [2]
diligently investigated the subject of the situation of the testis
in the fœtus, and the latter published his 'Observations on
Hernia Congenita' in 1755. J. Hunter (page 11) writes, " It is
plain that the cavity of the bag, or of the elongation of the
peritoneum, which contains the testis in the scrotum, must at
first communicate with the general cavity of the abdomen by
an aperture at the inside of the groin."   He then describes
the formation of the tunica vaginalis propria testis, and the
obliteration of the canal above and the closure of its ventral
orifice.   In 1801 Camper published a work [3] in which a plate
represents the dissection of an infant, made in 1759.   It is
there shown that the tunica vaginalis propria testis may be
perfectly developed, and the tube in front of the spermatic
vessels remain open.[4] Within the last few years M. Malgaigne
has adverted to this imperfection as a cause of inguinal hernia.[5]

In the plate at the end of this paper we have delineated
those congenital conditions of the vaginal process of the peri-
toneum to which we shall frequently have to refer in the details
of the following cases. We therefore add a brief anatomical
description of the region.

If a student would take advantage of the opportunities
afforded, he may soon make himself fully acquainted with the
anatomy of the vaginal process. We have made several
examinations of the full-grown fœtus, and have been much
surprised to find how frequently the vaginal process of the peri-
toneum remains patulous upon one side or upon both sides.
The state of this part, as delineated in fig. 1, is very common.[6]

[1] 'The Works of J. Hunter,' by J. F. Palmer, vol. iv, p. 1.

[2] ' Opuscula Path.,' 1755.

[3] ' Icones Herniarum,' pl. x.

[4] We have copied this drawing from Camper's book (see Plate, fig. 3).

[5] ' Leçons cliniques sur les Hernies,' Paris, 1841.

[6] We hope that before the lapse of much time there will be in the museum a
series of wax models, by Mr. Towne, to illustrate these parts.

For the details the reader is referred to the explanation of the Plate. It may, however, be noticed that at this early age there is scarcely any inguinal canal at all. The opening which connects the parietal peritoneum with the serous tube is sharply defined, however, and a little below the site of the external inguinal ring there is generally a slight narrowing or contraction of the canal. When the fœtus is not decomposed the vessels of the spermatic cord are clearly seen extending between the testis and their abdominal trunks, covered by the posterior layer of the serous tube. The elongation of the tube increases with advancing years, and consequently the distance between its mouth and the external inguinal ring is greater in childhood than in infancy, in the adult than in youth. Even in young persons (as well as in those who have reached middle life) long subject to visceral protrusions the length of the inguinal canal is preserved and the inguinal rings are wide apart. This anatomical disposition is demonstrated in a marked manner by the following cases.

The vaginal process of the peritoneum of a child is delineated in fig. 2. We have not any history, unfortunately, of this preparation, but it shows, at *c*, a contraction or corrugation of its walls, situated a little above the testicle. Now, before the tube was cut open, there must have been an opening leading from the funicular division of the vaginal process into that of the testis; consequently, the vaginal coverings of the testicle were imperfect. There is a hernial sac in the museum of the College of Surgeons, prep. 1343, which seems to be an illustration of that condition which would arise from this disposition of the parts; and Sir Charles Bell describes a similar case, to which is added a woodcut, in the 'London Medical Gazette' of 1828.[1] We may, perhaps, be allowed to express our conviction that the illustration on plate ii, fig. 2, in Mr. Key's edition of Sir Astley Cooper's work on hernia, belongs to this category of cases. The Cases 7, 8, 9, in this paper, are illustrations of this variety of the vaginal process.

We have never yet been so fortunate as to dissect the vaginal process of the peritoneum developed into that division proper to the testicle, and that one lying open in front of the cord. But Camper has given us a delineation of that condition which

[1] Vol. i, p. 485.

he found. We therefore reproduce it here, as that author's book is not always at hand. We see the two cavities of the vaginal process cut open in fig. 3, and between them a well-defined septum (*d*). Now, a hernia descending the funicular division soon after birth can never touch the testis with the parts thus disposed, but a visceral protrusion often takes place into this sheath, the existence of which is just as much due to congenital defect as that form of hernia which is named " congenital."

Further researches require to be made to ascertain the comparative frequency of this defect. Such examinations require, also, to be made at later periods than soon after birth, for it is just possible—we might say, perhaps, probable—that the tunica vaginalis propria testis becomes perfectly developed in some infants after birth, whilst the funicular division alone continues patulous. Certain it is that the viscera protrude along this serous canal, as the cases related further on demonstrate. One preparation in the museum of the Royal College of Surgeons may be an example of this variety :—" No. 1328. Part of the pelvis and abdominal walls of a young child, with the sac of an inguinal hernia, nearly two inches long, on the right side. The testicle is directly below the hernia ; the cavity of the tunica vaginalis is closed above, and has no connection with the hernial sac." [1]

The next congenital defect is that in which only the ventral orifice of the vaginal process of the peritoneum is closed, as at fig. 1. This condition we have never yet met with in our dissections, but it seems to be the only disposition of the part to explain the variety of hernia termed " infantile" by Hey, and " encysted hernia of the tunica vaginalis" by Sir A. Cooper. The nearest approach to this variety is a preparation in the museum, No. 2480, described " congenital hernial sac, with its mouth obliterated." Unfortunately, there is no history of the case from which it was taken.

Associated with defects of the vaginal process of the peritoneum, we find a class of cases characterised by congenital malpositions of the testicles. Such cases form an interesting class, and may be briefly stated as those in which the testis is

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[1] 'Descriptive Catalogue of the Path. Specimens,' vol. iii, p. 126.

entirely hidden, and those in which it is discoverable, but in an abnormal situation.

The cases are arranged in the following order :

I, A.—Those in which the vaginal process of the peritoneum remained open along its whole extent.

I, B.—Those where a constriction of the vaginal process of the peritoneum constituted an impediment to the reduction of the hernia, and was the cause of its strangulation.

II.—Cases of hernia associated with malposition of the testicle.

III.—Those depending upon an open state of the funicular division of the vaginal process of the peritoneum.

IV.—The cases in which the canal of the vaginal process of the peritoneum remains unobliterated, whilst its ventral orifice is closed, and a hernia pushes its sac before it along the open tube.

When possible, in each class, the cases are related in such an order as to show the ages when the hernia is developed, and the phenomena exhibited by the different conditions in which they have fallen under observation.

Class I, A.—Hernia into the Vaginal Process of the Peritoneum.

Case 1.—*Entero-epiplocele in the vaginal process of the peritoneum ; developed in infancy, observed in youth.*—A strumous-looking boy, æt. 7, was admitted on account of an irreducible inguino-scrotal entero-epiplocele, and he had been vomiting about forty-five hours. Constipation and nausea had existed for five days.

On the right side of the scrotum there was a swelling about three inches long by two broad. It was very tense and painful. It had been subjected to considerable manipulation. The testis was involved in the tumour. The boy had been ruptured from birth, or soon after. Chloroform was administered, and, after the gentle application of pressure by Mr. Bryant, the bowel was easily reduced.

Remarks.—It is scarcely necessary to relate here the cases

of inguino-scrotal hernia which are so commonly met with affecting infants. In those cases, as it is well known, the rupture descends into the scrotum, and lies in contact with the testis. It occupies, in fact, the cavity of the vaginal process of the peritoneum; that prolongation of its parietal layer becomes, in fact, the sac of the hernia—that sheath-like process which, being a congenital malformation, caused Haller to designate the rupture congenital.

The case above related is a good example, however, of a rupture developed soon after birth, which, from being neglected, that is, prevented, by using a truss, from descending into the scrotum along the persistent vaginal process of the peritoneum, is continually giving rise to trouble. This was a case of entero-epiplocele, a complication very frequent in this kind of rupture. The omentum very commonly becomes adherent to some part of the sac, and is therefore irreducible; but the intestine is reducible, and is liable to constant protrusion from the ventral orifice of the sac being always open, in consequence of the omentum traversing it.

The diagnosis of the scrotal tumour was not difficult. The constitutional symptoms indicated intestinal obstruction; the history was that of a rupture, and the kind was indicated by the situation of the tumour, the age of the patient, and from the manner in which the testis and hernia blended together.

The treatment of the case requires a word of comment. Considerable manipulation had been used before admission, without taking advantage of those means which were subsequently employed to produce relaxation of the abdominal muscles. This was an error; for as soon as chloroform produced its effect the intestine was easily returned.

CASE 2.—*Hernia into the vaginal process of the peritoneum in contact with the testis; developed in infancy, observed in manhood.*—A healthy man, æt. 29, the subject of hernia from infancy, came to the hospital on account of the irreducibility of the rupture, which had been in the scrotum three days. There was a large tumour on the right side of the scrotum, involving the testis. Two grains of opium, in powder, were administered; but, as the rupture still continued irreducible, the vapour of chloroform was inhaled, in the usual manner,

and when its effects were fully produced the protruded bowel was returned into the abdomen without difficulty. After the reduction of the hernia a careful examination of the inguinal canal demonstrated the marked distinction which exists between these cases in manhood and those which are developed *slowly* at a somewhat later period of life. The index finger could be passed through the external inguinal ring along the inguinal canal, and with its tip the internal inguinal ring was only just perceptible. It is also worthy of note that the handling of the tumour, with the pressure necessary to reduce the rupture, produced a marked contraction of the abdominal muscles, which action did not appear to be in the slightest degree under the control of the will.

Remarks.—This is an example of a case very commonly occurring. The man at his birth was the subject of an open vaginal process of the peritoneum, along which canal a portion of bowel subsequently descended into the scrotum, where it was in contact with the testis. The rupture being permitted to descend at any time, that serous sheath neither closed nor even contracted, one of which conditions might possibly have taken place had a suitable truss been used from the first. For the whole of his life the man was in perpetual risk of an intestinal descent and strangulation, which was but miserably precluded by constantly wearing a truss. In every case of inguinal hernia occurring in infancy a truss or some mechanical support should be employed, to prevent the viscera descending along the vaginal process. By doing this, the surfaces of the sheath are kept in contact, and its orifice frequently contracts sufficiently to offer an obstacle to any protrusion of the abdominal viscera, if it does not become entirely obliterated. The relative positions of the inguinal rings and of the space between them, characteristic features of these cases, was well demonstrated in this case. By this anatomical arrangement the hernial sac acquires a long neck, which lies in the inguinal canal.

CASE 3.—*Hernia in the vaginal process of the peritoneum; first descent at the age of twenty-four years.*—A strong, robust, healthy lighterman, æt. 24, was admitted with an irreducible

left inguino-scrotal rupture, which suddenly descended into the scrotum, for the first time, a few hours before, and during violent muscular exertion. Not a trace of any hernial tumour had been noticed before. The part was very painful. The testis was situated behind the protrusion, which consisted of intestine, and both were together in the vaginal process of the peritoneum. Ice was applied to the tumour, and a short time afterwards the man was placed under the influence of chloroform, when, after a little pressure made by Mr. Forster, the hernia was reduced.

The testis was in its normal situation, but, upon tracing the spermatic cord upwards to its passage through the external inguinal ring, the margins of which were distinct, it became lost in the inguinal canal, and the boundaries of the internal inguinal ring were not to be felt.

Remarks.—This case affords unequivocal evidence of the development of a scrotal hernia suddenly in a strong, healthy adult. The anatomical relations of the protrusion to the testis sufficiently decide its variety, and there cannot be any other conclusion derived from the facts than that the hernia traversed an open canal. But the first protrusion occurred at twenty-four years of age. Are we, then, to admit that the vaginal process of the peritoneum may continue unobliterated into adult life? Certainly. What other explanation can be given? Assuming the closure of the orifice of the vaginal process of the peritoneum at the usual period, the parietal peritoneum must have been thrust out before the hernia, or its tissues lacerated, in order that the protrusion could reach the scrotum. But under these circumstances it could never have been in contact with the testis. Moreover, other proofs exist that the peritoneal sheath remains patulous into adult life without a hernial protrusion taking place. At St. Bartholomew's Hospital Mr. Stanley found that canal open during an operation for the removal of a diseased testicle.

The anatomical arrangement of the inguinal rings, and the length of the canal between them, was likewise well shown in this man, for neither the internal ring nor the aperture of the vaginal process could be reached. The beneficial influence of chloroform was displayed most happily in the treatment of the rupture.

We shall next relate some cases in which it became necessary to perform a cutting operation in order to effect reduction of the hernia.

Case 4.—*Hernia in the vaginal process of the peritoneum; developed at infancy, observed in manhood; irreducible; operation; recovery.*—In 1842 a healthy man, æt. 24, was admitted under the care of the late Mr. B. Cooper. When an infant he was ruptured on both sides, but the rupture had not escaped on the left side for several years. He had occasionally worn a double truss, but very irregularly. For the last eight or nine years he had not used any truss on the right side, and there was always more or less protrusion in the inguinal canal and scrotum. The day before admission, whilst walking, he felt much pain in the abdomen, and soon after vomited. He returned home, went into bed, and obtained the assistance of a surgeon, who, finding the rupture, bled him in the arm to a large amount, and applied the taxis vigorously. Failing to reduce it, he sent him to Guy's Hospital, for the man vomited everything he swallowed.

A large tumour existed in the right side of the scrotum, elastic, tense, and hard, especially at the neck of the scrotum, where he complained of great pain. All the signs of the strangulated intestine were well marked, especially regurgitant vomiting. He was placed in a warm bath, and the taxis applied ineffectually. A bag containing ice was laid over the neck of the tumour; an enema of Haustus Sennæ was administered, and two pills, composed of calomel gr. iij and opium gr. ij, were swallowed. With the expulsion of the enema a few scybalæ were passed. Again a futile attempt was made to return the hernia by the taxis. About 1 p.m. Mr. Cooper opened the hernial sac in the usual way, which allowed the escape of a large quantity of serum, and exposed the testis. At the abdominal extremity of the sac a small knuckle of intestine, of a dark colour, was seen. The narrow orifice of the sac, which was deeply seated, was cut, and the hernia returned. The wound was dressed in the usual manner. In the evening all the signs of strangulation of the bowel had disappeared.

The next day he was in every respect doing well, and at

10 a m. an enema of Haustus Sennæ was administered. At
1 p.m., the enema having produced a fæcal evacuation, six
drachms of castor oil were given, and at 4 p.m. the bowels
had been relieved three times.

The third day he was progressing favorably; the bowels
were freely open.

The fourth day he was going on well, and, although the
bowel had acted yesterday, four drachms of castor oil were
given.

This patient recovered perfectly.

Remarks.—An interesting feature of this case is the cir-
cumstance of the patient having been ruptured on both sides
when an infant, and the absence of anything of the kind on
the left side for several years. We have herein a demonstra-
tion that the vaginal process must close to some extent, even
under ordinary conditions, for it is not likely that great pains
were taken to remedy the defect. But all surgeons must have
seen men who, after having worn a truss in infancy or boyhood,
have been cured of the rupture. In the higher walks of life
such cases are by no means rare. Having neglected to wear
any truss, there was always more or less tumour in the scrotum,
but at last a small enterocele became strangulated, and an
operation for its liberation was demanded. The scrotal
swelling was tense, and its neck hard and very painful. This
generally happens in these cases; the orifice of the sac being
narrow and rigid, its neck long and compressed by the con-
traction of the abdominal muscles, the protruded viscus is
much more firmly girt than are the contents of a hernial sac
of slow formation and of long standing, where the orifice and
inguinal rings all blend together, and the inguinal canal can
be scarcely said to exist at all. Having opened the hernial
sac, the testis was seen. This at once showed the kind of
hernia. The orifice of the sac, narrow and deeply seated, still
retained its position, although a rupture had been constantly
descending for more than twenty years—another characteristic.
The treatment of the case after the operation, by purgatives,
should be observed, as it offers a striking contrast to that pur-
sued at the present day.

CASE 5.—*Hernia in the vaginal process of the peritoneum, developed in youth, observed in manhood ; irreducible ; operation ; recovery.*—In 1850 a strong, healthy man, æt. 32, was admitted into Guy's, suffering with strangulated hernia in the vaginal process of the peritoneum. He had been ill twenty-four hours, but symptoms of strangulation had existed only six. For several years he had been ruptured on the right side, and the rupture, when in the sac, was in contact with the right testicle. He had never worn a truss, and this was the first occasion of severe trouble arising from the rupture. The tumour was much larger than usual, red, tense, elastic, and translucent over the lower half of its surface. It resembled the appearance presented by hydrocele of the tunica vaginalis testis, when the light of a candle is transmitted from behind. He was placed in a warm bath, opium was administered, and ice applied over the tumour ; but the rupture remained irreducible.

Eighteen hours after the manifestation of strangulation of the bowel, and thirty-six from the commencement of the attack, I made a vertical incision along the neck of the tumour, incised the hernial sac, and exposed a small knuckle of intestine. A large quantity of clear yellow serum escaped when the sac was opened. The intestine was distended with flatus, and its blood-vessels were congested, but the tissues were healthy. The orifice of the sac was cut, and the rupture returned into the abdomen. The edges of the orifice of the sac were sharp and well defined, and it was deeply seated at the superior or internal extremity of the inguinal canal, and far from the external inguinal ring. The testis was placed at the posterior wall of the sac.

Nothing occurred to interrupt progressive convalescence ; the patient had a few grains of opium, very restricted diet, and the bowels were allowed to act without the stimulus of medicine.

Remarks.—This case is an instance of a rupture first noticed in youth. Its characteristics are those of protrusion into the vaginal process of the peritoneum, and the fault committed in its early treatment lay in not wearing a truss. The appearances noticed when the tumour was carefully examined are worthy of remark, since, from its shape and translucency, it

resembled closely a hydrocele, and, in point of fact, a hydrocele it was, with a hernia. The large collection of serum, the small and inflated knuckle of intestine, caused the translucency of the tumour. But the constitutional symptoms and the history of the case precluded all doubt of the nature of the malady. The distinctly defined, sharp, narrow, and deeply seated orifice of the sac, was the cause which prevented the reduction of the protrusion, the constriction of which was, perhaps, rendered more severe by the extreme tension of the hernial sac. The subsequent treatment of this case offers an opportunity of comparing the different plans recommended.

Case 6.—*Hernia in the vaginal process of the peritoneum; developed in youth, observed in manhood; strangulation; operation; ulceration of bowel; death; necropsy.*—A man æt. 48 was admitted into the hospital, under the care of Mr. Cock, who had been suffering with strangulated hernia about forty hours. The taxis had been freely employed before admission, and when the hernial sac was opened the bowel was found to have an ulcerated opening in its walls. The viscus was attached to the edges of the wound by sutures, and the man survived twenty-five days. This man had been ruptured from boyhood, and for twenty years he had constantly worn a truss. The rupture occupied the right vaginal process of the peritoneum, and was in contact with the testis.

For several days this patient progressed very satisfactorily, the contents of the digestive tube, of course, passing through the wound in the groin. Suddenly, on the twenty-fourth day from the operation, he was seized with faintness; he rapidly became collapsed, and died in twenty-four hours.

Necropsy.—Not a trace of general peritonitis. The portion of the intestinal canal fixed to the wound was jejunum; it was adherent to both the external and internal inguinal rings, and partially to the inguinal canal. For two feet above and three feet below this point the bowel was deeply congested. The obstruction to the passage of the contents of the alimentary tube was formed by a band confining the bowel just below this congested part.

Remarks.—Although this case has been already briefly

reported by Mr. Bryant,[1] I venture to reprint it here, inasmuch as the description of the after-death examination by Dr. Wilks[2] affords unbiassed evidence, if any were wanting, of the remarkable manner in which hernia into the vaginal process of the peritoneum carries with it its characteristics even to the verge of the grave. This man, ruptured in boyhood, had been the subject of hernia for about thirty-eight years, during twenty years of which period he had worn a truss. But we find the inguinal rings separated, the inguinal canal long, and, as reported of the after-death examination, the ruptured bowel *"was adherent to the external abdominal ring, so also at the internal and between the two,"* clearly showing that the two inguinal rings had not been approximated, nor the inguinal canal obliterated, during a period of more than thirty years.

In relation to the treatment of these cases, this one shows the great damage which may be inflicted on the intestine by too forcible pressure; for observe, that after forty hours' strangulation only, the bowel was found to have been burst.

CLASS I, B.—We have next to describe a class of cases in which, although the rupture traverses the vaginal process of the peritoneum, it may or may not touch the testis, and it may become strangulated by a constriction in the body of the hernial sac itself, as well as by its ventral orifice. The anatomy of the condition which causes these results is described at page 263. Examples of this variety of hernia are noticed by Pott, Scarpa, Sir Astley Cooper, Mr. Lawrence, and others. Wrisberg " ascribes the constriction to the partial accomplishment of the natural process of obliteration,"[3] whilst others attribute the constriction of the sac to the effects of inflammatory action. We cannot now, however, any longer doubt which is the correct explanation.

These cases occupy an intermediate position, as it were, between those last described and the cases in which the tunica vaginalis propria testis is perfectly developed, whilst the funicular division of the sheath continues patulous after birth.

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[1] ' Guy's Hospital Reports,' 1861, p. 54.

[2] ' Records of Post-Mortems,' 1854, No. 117.

[3] Lawrence, on ' Hernia,' p. 574.

CASE 7.—*Scrotal hernia, left side, suddenly developed in adult life; testis in scrotum; strangulation of bowel seventy-five hours; operation; large quantity of serum in sac; impediment to reduction; a constriction formed by the sac itself; cure.*— A labourer æt. 29, badly nourished, and rather deficient in mental capacity, was brought to Guy's Hospital in September, 1858. He was in a very prostrate condition, and suffering with a rupture in the left side of the scrotum, which had never been observed until seventy-eight hours before. After a careful examination we were all struck with the small size of the neck of the tumour, its pyriform figure thus closely resembling a hydrocele, and the apparent absence of the left testis. The external ring was distinctly recognisable, and into it I could pass my finger, but I could not distinguish between the spermatic cord and the neck of the hernial sac. On palpation a very audible gurgling was induced in the swelling between the internal ring and the upper part of the scrotum. The left side of the scrotum was red, the integuments tense, and the entire tumour divisible into an upper smaller portion and an inferior larger. This last was persistent and unalterable by manipulation; but the upper portion was soft, and entirely disappeared when slight pressure was applied. It was, however, reproduced by the movements of the patient, or by gently pressing on the abdomen above the internal inguinal ring. As the liberation of the bowel was urgently demanded, and finding, when the man was fully under the influence of chloroform, that the bowel was irreducible, I determined to operate forthwith. An oblique incision, about four inches long, was made over the inguinal region and upper part of scrotum, the external abdominal ring corresponding with the centre of the incision. All the tissues were distinctly recognised as they were exposed, and the loose, expanded fibres of the aponeurosis of the external abdominal oblique muscle constituted a very imperfectly developed external inguinal ring. I could now pass my finger easily to the internal inguinal ring, trace its boundaries, and at the same time feel the protrusion which was lying exposed in the inguinal canal. A very distinct constriction could be seen, forming an hour-glass contraction in the sac, at a point corresponding with the ramus of the os pubis, over which, in fact, it crossed. I opened the hernial sac above this constric-

tion, and exposed intestine only. I next attempted to extricate the firmly girt bowel, but could not. Next I passed a grooved director into the lower part of the sac, through the constriction, when blood-tinged serum escaped. Even when the sac was nearly empty I could not then extricate the bowel. What chance was there, then, of reducing the bowel by the taxis? The constriction was next divided, and then the strangulated bowel came into view. It was very much inflamed, of a dark-claret colour, and with patches of lymph upon it.

The left testis was now visible at the fundus of the sac, and the variety of the hernia was at once apparent. The ventral orifice of the vaginal process of the peritoneum had never been closed, and a narrowing of this serous canal had taken place at a spot corresponding with the site of the external ring, forming there a firm fibrous circle, but quite independent of the tissues composing the external inguinal aperture. The protruded viscus, suddenly descending, became rapidly constricted, and finally strangulated by this fibrous ring, to remove which the opening of the peritoneal sack became imperative. The after-treatment consisted in the exhibition of opium, the lowest diet, and ice when thirsty; the local treatment, dry lint over the wound. On the evening of the eighth day after the operation a hard, solid motion was passed, and on the tenth day a more healthy one. The wound healed by adhesion. As there was a tendency to a protrusion on the right side, a double truss was given to the man.

Remarks.—The outline of the scrotal tumour was a fact which especially calls for notice in this case. Its striking resemblance in form to that of a hydrocele, and the absence of the testicle, might have led a casual observer, in the absence of the severe constitutional symptoms, to presume that that malady was the cause of the swelling. But upon manipulation of the inguinal canal, in which there was slight fulness, that peculiar gurgling sound was produced which results from the displacement of the gaseous and fluid contents of the bowel. The diagnostication of the presence of intestine being palpable, the next point would be to discover the cause of the irreducibility of that viscus, for clearly there was not sufficient

constriction at the orifice of the hernial sac to prevent regurgitation and the passage of the contents of the digestive tube; and if the contents, why not of the canal itself? Now, the marked outline of the scrotal tumour we believe to be sufficient to diagnosticate the particular nature of the case, after having clearly ascertained the protrusion of bowel. The hour-glass shape is perfectly characteristic. Then the suddenness of the development of the rupture, *into the scrotum,* at the age of twenty-nine, may be accepted as evidence that the vaginal process of the peritoneum had continued unclosed, and the urgency of the symptoms sufficiently indicated that the portion of protruded bowel was firmly gripped somewhere. Failing to reduce the hernia after the abdominal muscles were fully relaxed by the effects of chloroform, the operation of opening the hernial sac was at once undertaken. Step by step the coverings of the hernia were divided, but the constriction of the bowel was not produced either by the external or internal inguinal rings. Even when the sac was opened, perfectly healthy, and not highly congested, intestine was seen lying along a part of the inguinal canal. But the coil could not yet be released. The constriction which embraced it just admitted a grooved probe. Traction, under the most favorable conditions, was still inefficient in extricating the hernia. The use of the knife was required to cut its tissues, and then, and then only, was its liberation complete. In these facts we find full justification for the operation; by no other means could the intestine have been reduced. Indeed, this alone would seem to teach the futility of all hopes of returning the protrusion by the taxis only when this hour-glass-shaped contraction of the body of the tumour exists. The treatment after the operation consisted in restraining the action of the alimentary canal until the tissues of the injured intestine had had time to become repaired, and on the tenth day a healthy motion was expelled.

CASE 8.——*Hernia into the vaginal process of the peritoneum, developed in an adult, strangulated; operation for its liberation; death; probably from ulceration of intestine causing peritonitis.—— Hernia developed between twenty and thirty years of age; canal long, rings widely separated; impediment to reduction, the*

*constriction of the sac itself, at a point a little below the site
of the external abdominal ring. Testis in scrotum.*

In April, 1853, a man æt. 40 was admitted into Guy's,
labouring under symptoms of strangulated hernia, which did
not appear severe, although, probably, of about forty hours'
duration. The scrotum was quite black, in consequence of
ecchymosis, the result of the application of the taxis. He was
placed in a warm bath, opium administered, and ice was applied
to the tumour. Twenty-six hours after his admission, all
efforts to reduce the hernia having proved futile, it became my
duty, as assistant-surgeon, to operate upon the case. The
tumour had increased in size, was more tense and more painful.
I made an incision over the neck of tumour and freely ex-
posed the external ring, which tightly embraced the swelling
at this part. I then opened the peritoneal sac, and found a
large portion of small intestine adherent to it, very congested
and covered with lymph. About two drachms of sanious serum
escaped when the sac was opened.

It now became quite clear that the protruded bowel was
firmly constricted by a contraction of its tissues at a point
about an inch above the testicle, and which very nearly corre-
sponded with the site of the external inguinal ring, but was a
little below it. This constricting portion of the sac was divided,
and the hernia, after gentle manipulation, was returned with-
out cutting the internal inguinal ring. The inguinal part of
the vaginal process of the peritoneum was exceedingly long
and narrow, and the inguinal rings were consequently separated
widely apart.

The patient was much relieved by the operation, and for
thirty hours he progressed favorably under the influence of
opium combined with calomel. Suddenly he complained of
intense pain, rolled about on the bed, whereupon he was with
difficulty held; soon became collapsed, and died thirty-seven
hours after the operation, and about one hundred and five after
the first symptoms of the attack. The bowel had been stran-
gulated about sixty-six hours before it was released, and
very great damage had been inflicted upon it by the
" taxis."

A post-mortem examination was refused, but there can be
little doubt that ulceration and perforation of the intestine

had taken place, and allowed extravasation of the contents of the alimentary tube into the peritoneal cavity.

Remarks.—The point most worthy of notice in the foregoing case was the amount of injury to the scrotum, and, we may presume, to the contents of the hernial sac, by the forcible pressure employed in the taxis, and which entirely failed to pass the hernia through the scrotal constriction. Too much delay was allowed in this case after his admission at the hospital before the bowel was liberated; but had there not been damage inflicted upon the bowel by the taxis, the natural constriction would not probably have caused irreparable injury in only sixty-six hours. Observe in this case, also, that the orifice of the hernial sac did not offer any impediment to the reduction of the hernia, and that that opening and the contraction of the sac in the scrotum were wide apart.

The next case is introduced rather on account of its extreme rarity than as an example of strangulated hernia. It belonged to the same class of cases we have been just considering, but it was examined under very different circumstances. A brief history and an account of the post-mortem examination have been already published in the 'Transactions of the Pathological Society,' vol. x.

Case 9.—*Right inguinal hernia, developed in childhood; cysts over the external inguinal ring; symptoms of strangulated bowel; exploration of sac; hour-glass contraction of the vaginal process of the peritoneum; death from peritonitis, arising from perforation by ulceration of bowel in abdomen.*—A man was admitted into Guy's Hospital, May 25th, 1858, under my care. He was then moribund, and complained of great pain in the abdomen generally, but especially across the mesogastrium. He attributed this illness to having eaten rhubarb pie. It commenced with intense and sudden pain twenty-one hours before I saw him. He vomited all food. The bowels had been freely relieved the day before this attack, but, by his own desire, he took an aperient after its commencement. Mr. Smith, of Blackheath, attended him about sixteen hours after he was taken ill, and, thinking that a

hernia was the cause of the illness, advised removal to the hospital.

In the right inguinal region there was a swelling, which evidently contained fluid, and behind which I thought I could feel the testicle. This tumour was lying on the tendon of the external oblique muscle, or just over the external ring.

The man stated that he had been the subject of hernia on the right side for many years, and that he had been dangerously ill about six months since, in consequence of difficulty experienced in reducing a hernia. For thirteen days he had no evacuation from the bowels; he vomited continually during this time, and his life was despaired of. Subsequently the rupture returned, he recovered, and continued tolerably well until this attack commenced. He now made no reference whatever to the rupture, and said, when it was spoken of, " The rupture has nothing to do with my complaint," meaning that there was now no descent of bowel.

The existence of the swelling in the inguinal region, associated with the constitutional symptoms, led to the supposition that there might be a small piece of bowel at the orifice of the hernial sac, and strangulated by it. The man at once consented to an exploration of the tumour, and I made a single incision over its centre, about three inches long, opened a cyst which contained a few drachms of serum only, and which was a closed sac. Fibrous bands crossed it, and on its posterior surface was an elevated mass, like the epidydymis in shape. It proved to be a lobe of fat. I next opened another serous sac, which contained no fluid, its cavity being, however, well marked, from the gliding of its surfaces on each other. Searching at the external ring, I could not find any tumour, but behind it I opened the inguinal or funicular portion of the vaginal process of the peritoneum. Then some discoloured, yellowish, odourless fluid escaped, which contained flakes of lymph. The tunica vaginalis reflexa was next cut, nearer to the scrotum, and the cavity of the tunica vaginalis exposed, as well as the testis. A director was then passed from below upwards, from the one serous cavity to the other, and the tissues divided upon it. The finger now passed freely along the inguinal canal and into the abdomen, but there was not any strangulated bowel discoverable. Some more fluid, similar to that before

described, escaped from the abdomen, and it resembled closely the ordinary contents of small intestine. It may be noticed, however, that it emitted no fæcoid matter.

Opium and stimulants were administered, but the patient died thirty-eight hours from the commencement of the attack.

Necropsy.—A dissection of the abdominal parietes was made from without, but there was not any hernia at the internal ring. Close to its abdominal surface a coil of small intestine was adherent, which coil was lying parallel with Poupart's ligament, and obscured the view of the viscera beneath it. This was attached to the abdominal walls by *recent* adhesions. After this had been carefully removed another coil of intestine was brought into view, attached by *old* adhesions just inside the posterior margins of the internal abdominal ring. Between this and another coil there was a communication which led directly from the one into the other. Near to this the bowel was much constricted. The portion of the intestines thus conjoined and continuous was jejunum, about eighteen inches from the termination of the duodenum.

Effusion of the contents of the alimentary canal had taken place by a breaking down of a part of the old adhesion, or, perhaps, by recent inflammation and ulceration. General peritonitis and effusion of lymph existed throughout the abdominal cavity.

Explanation.—This man had been the subject of reducible inguinal hernia for many years, that variety which descends into the vaginal process of the peritoneum, and in which sheath a contraction had taken place, as occurred in the preceding cases. On account of the liability to the protrusion, he had constantly worn a truss, the pressure of which probably gave rise to the formation of the cysts.

The particular variety of this species of hernia is shown by the communication which existed between the testicular and the funicular divisions of the vaginal process of the peritoneum. At the time we examined it the connecting foramen had probably contracted, as the hernia had not descended into the vaginal process for several months.

The remarkable feature of this case, which was only revealed after death, is the union and communication which had

formed between two coils of intestine as the result of long-continued strangulation, and the return of the bowel, which then formed the hernia, into the abdominal cavity. This is a rare example of a patient surviving such a disease for about six months. See the preparation of the bowel in the museum, 2492[10], and drawing.

Class II.—Hernia into the Vaginal Process of the Peritoneum, associated with Malposition of the Testis.

This series of cases is chiefly characterised by malposition of the testis. When that organ occupies an abnormal situation the vaginal process of the peritoneum frequently remains patulous after birth. Its length varies considerably; sometimes it does not extend as far as the external inguinal ring, and it seems at others to be pushed downwards by the hernia until its fundus passes through that opening into the upper part of the imperfectly developed scrotum. It may even turn upwards, insinuating itself between the integuments and the aponeurosis of the external abdominal oblique muscle.[1] John Hunter writes :[2] " When the testicle has remained in the cavity of the abdomen beyond the usual time, it is impossible to say whether the disposition for closing up the passage, after it has passed out, is in any degree lost or not; but when it comes down after birth we can easily suppose a portion of intestine or epiploon is more likely to descend, and prevent the closing of the mouth of the sac, than before the child was born, when certain actions had not taken place." He also alludes, a little further on, to the facility with which the testis can in general be pushed up again into the abdomen after it has got outside the tendon. If this be really the case we have an explanation of those circumstances which patients often describe relating to the disappearance of the testicle at the time of the development of the rupture. An instance of this peculiarity is afforded by the first case in this class, although one cannot avoid feeling some doubt regarding the accuracy of the patient's observation. This is not, however, an isolated instance of such a statement.

[1] Dr. Fano, ' L'Union Médicale,' Dec., 1861.
[2] Palmer's edition of ' The Works of John Hunter,' vol. iv, p. 16.

A similar history has been related to us by more than one man. John Hunter observed a case of rupture which happened " in a man thirty years old, where the testicle had not even got into the ring" (p. 17).

The cases to follow are good examples of a class which are oftentimes difficult of diagnosis, perplexing from the obscure history in which they are involved, and a source of great anxiety to the surgeon. But there is a principle which may generally guide the surgeon in these cases. It is this. To explore the inguinal region in all cases where there exist symptoms of strangulated intestine, and upon that side on which the testis is malplaced. But occasionally both testicles are absent from the scrotum, and there may be great difficulty in ascertaining upon which side the rupture has protruded, or, if there is a hernia on both sides, which of them is strangulated. In such a perplexing case, after having opened one vaginal process and finding it empty, is it justifiable to examine the other side ? Yes. Dupuytren [1] did so, found the strangulated intestine, and saved the patient's life.[2]

CASE 10.—*Inguinal hernia into the vaginal process of the peritoneum, developed in eleventh or twelfth year of age ; testis at the external abdominal ring.*—I was consulted by a patient æt. 19, who gave the following history of his case :—Until his eleventh year he was quite sure that both testicles were in the scrotum. About that period he was thrown on to the pommel of a saddle whilst on horseback, and that the blow pushed the right testis into its present position. He experienced great pain from the accident, but in a few days was well. On two or three occasions, after exertion, a large swelling had appeared above the testis, and six weeks before I saw him a surgeon attended him with almost strangulated hernia. It was then, however, reduced. When I saw him the right testis was placed in front of and partly between the pillars of the external abdominal ring ; there was no hernia, but a very decided impulse could be felt at the internal ring

[1] 'Leçons Orales,' edit. 1832, t. i, p. 583.
[2] The reader is particularly referred to the interesting and most valuable work of M. E. Godard, 'Études sur la Monorchidie et la Cryptorchidie chez l'homme,' Paris, 1857.

when he coughed. This patient was the subject of a hernia into the vaginal process of the peritoneum, which had probably never extended into the scrotum. A truss was worn to support the hernia.

CASE 11.—*Epiplocele; symptoms of strangulated intestine; exploration of hernial tumour.*—A thin, sickly looking, weak-minded man was brought to Guy's by his father, who was a large, stout, healthy fellow. Difficulties as to previous history arose from the ignorance of both; throughout, their manner of replying to questions caused one to feel incredulous.

The patient complained of great pain in the left hypochondrium and across the abdomen, in the umbilical region especially. He said he had been hurt about fifteen days before, when pushed down to the ground. Since the injury then inflicted he had been ill.

Condition on admission.—He was in a state of collapse. Surface, especially of extremities, cold, shrivelled, mottled, dry, pinched; lying listless, and answering incoherently, often by a mere nod of assent or the contrary; pulse very small, voice weak. Facial aspect pinched, congested, but its congenital configuration might have increased the swarthed appearance it presented. Abdomen flat; pressure in hypochondriac and umbilical regions caused pain; tympanitis absent. There was a hernial tumour coming from left groin, and stretching the skin between external ring and scrotum, about four inches long, probably an epiplocele. Testes absent from scrotum, which, although its size and colour were very distinct, was only a fold of skin. The left testis was not perceptible; the right passed in and out of the inguinal canal.

The bowels having been constipated for several days, on the 5th May, three days before admission, he took Ol. Ricini, which he says produced slight evacuations. He seems to have vomited yesterday, the day before admission, the 7th, but not since. He had taken very little food for several days. He had a good deal of bronchial obstruction, and coughing gave him pain. By this act the hernial tumour was influenced, although not sensibly enlarged, as if by the descent of more viscera.

Thinking that there might be a small piece of intestine at the internal ring, being sure that the hernia was into the

vaginal process, that the chief mass was omentum, and that an exploration of the sac was demanded, I proposed to operate. The man immediately assented in these words,—"Do anything to relieve me from this pain." Just before commencing to move him he became rigid, and his father then stated he occasionally had fits, besides being addicted to taking stimulants. When the rigidity had passed off, which it did in a few minutes, he was placed under chloroform. I made an incision in the groin over the long axis of the tumour, exposed the external abdominal ring, and then opened the hernial sac. Omentum only was seen; I examined the internal ring, and, not seeing intestine, I passed my finger through it and felt intestine within the abdomen, and a sort of band posterior to the ring, but of what nature, or what were the relations of this band, I could not discover. I gently brought out from the abdomen more omentum, thinking to get out adherent intestine, but I did not find any.

The omentum was carefully examined at the orifice of the sac and at its scrotal termination. However, no protruding intestine was found, but it embraced the testis below, and was adherent to it.

There was no serum in the sac. The orifice of the sac was large.

The edges of the wound were closely adjusted by including hernial sac as well over the omental protrusion, and dry lint applied.

Friday, 9th.—The pain had ceased, and the general condition was improved; there was slight tenderness near the hernia when pressed there. Slight bronchial irritation. Linct. opiatus. Bladder emptied by catheter.

Saturday, 10th.—He felt very comfortable, was free from pain, and the wound appeared to be closed.

Sunday, 11th.—During the day was comfortable, but in evening there was very great difficulty in respiration, from mucous accumulation.

Monday, 12th.—Pulse rapid, which has been the case ever since the operation. Respiration quick. Says he feels comfortable. No tenderness over abdomen. Fluid diet—milk, beef tea.

Tuesday, 13th.—Cough troublesome.

Wednesday, 14th.—Bowels acted before noon, copiously. There was slight suppuration on the surface of the wound. The sutures were removed.   Cough troublesome.

From this date he progressed favorably, the protruded omentum shrinking.

CASE 12.—*Hernia in the inguinal canal, bubonocele, developed in youth; neither testicles discoverable; strangulated intestine about seventy-two hours; operation; cure.*—A lad æt. 17 was sent to Guy's Hospital with the following note:—" On September 14th I was called at 11 a.m. to this lad, who, upon inquiry, I found had suffered from attacks of colic, at times, for some months previous.   His symptoms were pain in the bowels and flatulence, but the bowels were relieved about two o'clock p.m.   Sickness came on; aperients and antispasmodics were administered, with little or no palliation of the symptoms. On the 15th the youth was in much the same condition.

" On the 16th he was no better, the sickness continued, and, the material vomited having a fæcoid appearance, I became suspicious of hernia.   Upon examination I found that his testicles had never descended into the scrotum, and that there was a slight fulness opposite both external rings, but still no protruding intestine could be discovered.

" It being a very uncommon and perplexing case, and the patient being within half a mile of a railway station, I despatched him to Guy's Hospital on the evening of the 16th."

He was admitted into a physician's ward, and the next day about twelve o'clock I saw the patient.   The symptoms were characteristic of strangulated intestine.   There was a fulness at both the right and left internal inguinal rings, but at the right one and in the right inguinal region there was a swelling, but not a well-defined tumour.   The testes could not be felt anywhere.   Under these circumstances chloroform was administered, and, as pressure upon the swelling did not diminish its size, I explored the inguinal canal.   A membranous sac was exposed, which I carefully opened, and brought into view a small knuckle of intestine and its mesentery.   The bowel was congested, and it was returned to the cavity of the abdomen without cutting the mouth of the peritoneal sac.   The sac contained a considerable quantity of brown serum.   This was

the first occasion upon which the patient had been so ill, and he had never worn any truss. The testis was not seen at the operation. The impediment to the reduction of the hernia arose from the orifice of the vaginal process of the peritoneum, and probably the greater amount of narrowing of that aperture by the tension of the sac resulting from the quantity of effused serum. Also it was quite impossible either to get hold of the swelling or to fix the ring, two points essentially required to effect reduction by the taxis. Opium was given, but in small quantity. The patient never had an untoward symptom, and was convalescent in a day or two.

Remarks.—The difficulties which presented themselves in this very interesting case arose from the imperfect history we were able to obtain from the patient, and in consequence of the absence of such a swelling as a rupture usually produces. It required very careful manipulation to discover any tumour at all, but when a comparison of the two sides was made a certain fulness was perceptible on the right side, none on the left. The absence of the testicles led to the inference that there might be an open vaginal process of the peritoneum, as experience of these cases teaches.

The plan adopted was to carry out the principle of exploration, before spoken of, and the successful issue of this case might be urged in its support.

Case 13.—*Hernia into the vaginal process of the peritoneum; strangulation; operation for its reduction; death; peritonitis; testis in the inguinal canal.*—A man æt. 36, robust, healthy, and muscular, came into Guy's Hospital, under my care, in February, 1856, at about 9.30 a.m. He was the subject of strangulated inguinal hernia, with which he had been suffering since 2 a.m., or about seven hours. He was placed in a warm bath, and two grains of solid opium were administered. One hour after his admission I saw him; he was suffering intense pain, rolling about on the bed, and unable to endure the gentlest manipulation of the tumour, which occupied the right side of the scrotum. He gave the following history of his case:—He had been the subject of reducible inguinal scrotal hernia on the right side as long as he could recollect anything,

and the right testis had never descended into the scrotum, but was placed in the inguinal canal, where it could be felt when the hernia was reduced. He had worn a truss constantly, which usually prevented the descent of the hernia ; but about six years since there was considerable difficulty in reducing the rupture, and for about a period of six hours. Upon this occasion he felt the bowel descend suddenly whilst in the act of quickly stepping from a cab ; he could not reduce it ; it was soon painful, and in an hour he experienced intense pain. It was this time larger than he had ever seen it. After attempting to reduce it himself he came to the hospital.

The tumour was oval, elastic, and tense. I placed him under the influence of chloroform, and by gentle pressure the tumour became less tense, smaller, and I could feel the testis. Ice was applied to the tumour until 1 p.m., when I found him suffering as at first. It remained diminished in size for some time, but in the act of coughing it resumed its original size, and was more painful than ever.

At 1.30, or about ten and a half hours after the first signs of strangulation of the bowel, I operated upon this case, making an incision along the anterior surface of the tumour, which commenced one inch above the external abdominal ring, and extended downwards for three inches. The tissues external to the peritoneal sac were clearly discernible ; the sac itself was opened, from which serum, tinged with blood, escaped ; and small intestine and mesentery were exposed. The bowel was extremely congested, its tissues healthy, elastic, bright, and slightly inflamed in patches. The internal abdominal ring was very small, and it was necessary to incise it before the reduction of the protrusion could be effected. The length of the canal and, consequently, the depth of the internal ring were very great, circumstances giving rise to considerably difficulty in the division of the constriction around the bowel. The testis was lying in the inguinal canal, close above the external ring. The wound was brought together with sutures and water-dressing applied to it.

The after-treatment consisted in the administration of opium in powder, gr. j every two hours, and ice to suck.

10 p.m.—Said he felt very comfortable, and, with the exception of thirst, he made no complaint. Skin rather hot,

but moist; tongue moist. Pulse variable, between 70 and 80, slightly irregular, full. Passed no urine. Pain produced by gently touching the right iliac region.

To apply twelve leeches to the iliac region, and to add half a grain of calomel to the grain of opium, and take it every two hours.

24th.——He dosed at intervals during the night, but never seemed to sleep soundly. At 10 a.m. he was pulseless and in a state of perfect collapse, and at 10.30 he died.

Necropsy.——I was only able to ascertain the condition of the abdominal viscera by enlarging the wound, in the tissues about which suppuration was advanced. There was general acute peritonitis and effusion of plastic lymph. The coil of intestine which had formed the hernia was deeply congested and inflamed, but in a condition which might have recovered.

Remarks.——The suffering before our observation was seven and a half hours; symptoms of strangulation of the bowel before the operation had existed ten and a half hours; the bowel was relieved after its descent in eleven and a half hours; death occurred after the first symptoms in thirty-one and a half hours, which was caused by general peritonitis and effusion of plastic lymph. We have recapitulated these chief features of the case, as they are the points to which attention should be particularly directed.

In this case we have the facts as accurately stated as it is possible to obtain them, for the man was under our observation in less than eight hours after the rupture suddenly descended. We may observe with what rapidity the signs of strangulated bowel appeared, and take the opportunity to observe the condition of intestine as revealed by the opening of the hernial sac after eleven and a half hours' constriction. The manipulation to which the hernia was subjected was never sufficiently violent to injure its tissues, for the taxis was carefully employed, and, moreover, the serum in the sac was a great protection to the protruding viscus. But we found it extremely congested and inflamed, which conditions must have been produced by the constriction of the orifice of the sac. The rupture was a simple enterocele, so that there was not any omentum occupying the opening, and therefore the whole

pressure was exerted upon the bowel. The orifice of the hernial sac was widely separated from the external abdominal ring, and its diameter was so small as to require to be cut before the bowel could be returned. Yet this man had been ruptured probably for thirty years. How intense were the symptoms of strangulation also within a brief period. They were not under the slightest control by ordinary means, and therefore the operation was urgently demanded. Very considerable and immediate relief was given by the liberation of the bowel, and for a few hours the patient expressed himself as feeling very comfortable, but in about eight hours after the operation symptoms of peritonitis were distinct. Treatment to combat that malady was employed, but without good result, for the man died in about twenty hours after the operation, and thirty-two from the descent of the rupture. To what circumstance is this rapid fatality in this instance to be ascribed? If we had not made an examination of the bowel after death, we should have suspected that it was burst but that viscus was simply inflamed, and its tissues would have recovered their healthfulness had the patient survived. Acute general peritonitis and plastic effusion, however, had been developed, and in this fact we find quite sufficient cause to explain the rapid dissolution. Is it that the effusion, when thus rapidly poured out, acts as a poison, which produces such depression of the nervous symptom, as evidenced by collapse, that the patient is unable to rally from the shock? Such would seem to be the explanation of these cases. We can scarcely doubt that the introduction of a portion of intestine, the serous coat of which is acutely inflamed, would tend to excite a similar action in the neighbouring parts, and so long as that morbid action is limited and circumscribed the chances are favorable to the recovery of the patient. But when the disease extends throughout the entire peritoneal membrane, as it probably did in this case, a fatal result must almost necessarily ensue.

CLASS III.—HERNIA INTO THE FUNICULAR VAGINAL PROCESS
OF THE PERITONEUM.

We now pass on to those cases which may probably give
rise to doubt in the minds of some of my readers. They have
been, however, collected with great care, and not one has been
introduced of which any reasonable doubt could be raised on
account of the accuracy of the statements of the patients or
their relations. We have now to show that a rupture often
descends into the funicular division of the vaginal process of
the peritoneum; and, as the vaginal covering proper to the
testis is *perfectly* developed, the hernia and that organ are
never in contact with each other. In this respect the hernial
protrusion is identical, in its relative position to the testis, with
that of a slowly forming rupture; but as we advance we shall
discover characteristic differences between them.

A healthy, well-developed boy, æt. 10, was under my care
in Guy's Hospital on account of a small accumulation of
fluid, which occupied a sac extending from the internal inguinal
ring downwards to the testis, on the right side. It caused
no inconvenience, but merely a swelling, which occupied the
inguinal canal and the upper part of the scrotum.

By gently pressing the scrotum the sac was slowly emptied,
the fluid entering the general peritoneal cavity at the internal
inguinal ring. It is probable that the orifice of this sac was
exceedingly small. The testis was distinctly felt in its normal
position in the scrotum, and quite separate from the sac con-
taining the fluid.

Here we have an illustration of a hydrocele of the funicular
division of the vaginal process of the peritoneum, and of that
canal remaining patulous, having its orifice communicating
with the general peritoneal cavity.

John Hunter relates a case of a similar kind:[1]—"In
some cases the aperture of the sac is not entirely closed,
allowing a fluid to pass down and form a hydrocele; which
fluid, upon pressure, can be squeezed back into the belly."
Hunter doubtless alludes to those cases of infants, common
enough, in which serum accumulates in an unclosed vaginal

[1] 'Hunter's Works,' vol. iv, p, 13.

process of the peritoneum, and by which fluid the testis is bathed. The case last described occurred, however, in boyhood, and the testicle was distinctly surrounded by its proper serous covering. Now, if in this case a hernia had passed along the canal, we should clearly have had a rupture into the funicular division of the vaginal process of the peritoneum. The following cases are demonstrative of the fact. If the hernia had descended into the scrotum, and had been found in contact with the testis, no surgeon would have doubted for a moment that the rupture was due to the congenital non-closure of the vaginal process of the peritoneum. At once the observer would have said, " Here we have a congenital rupture." Now, when it can be demonstrated that the tunica vaginalis propria testis is sometimes perfectly developed, and that the funicular vaginal process remains patulous, if the occurrence of one kind of hernia is generally admitted, why should not the other kind be taken into consideration as of equal importance and as anatomically correct ?

Case 14.—*Double inguino-scrotal rupture, developed in infancy, observed in boyhood, the distance between the orifice of the hernial sac and the external inguinal ring preserved on both sides.*—A delicate boy, æt. 10, and the subject of several deformities, came into the hospital under my care on account of double inguino-scrotal rupture on the left side ; the rupture was first noticed when he was three days old ; the right was not developed until he had nearly reached one year. The right external inguinal ring was the largest, and the hernia was so likewise. Neither the right nor the left internal inguinal rings could be felt.

Both testicles were at the fundus of the scrotum, and distinct from the hernia, each being invested by its proper serous envelope, the tunica vaginalis propria testis.

He was admitted on account of the difficulty experienced in preventing the right rupture from coming down. Confinement to bed, with a pad and bandage applied over the inguinal canal, for a few weeks, so far improved the state of the region as to enable him to wear a truss which supported the hernia, when he quitted the hospital.

CASE 15.—*Inguino-scrotal rupture, first noticed in infancy and probably formed in one night.*—A delicate child was observed to be ruptured when eighteen months old. Nothing of the kind existed before that age, according to the statement of a very careful mother, who tended the infant. It was developed in one night; that is, when the infant was washed before going to bed in the evening, the swelling in the scrotum did not exist; the next morning there was one. The infant was labouring under whooping-cough at the time.

In this case the right funicular division of the vaginal process of the peritoneum had been converted into a hernial sac. The right testis was in its normal situation in the scrotum, and enveloped by its proper vaginal tunic, and was, therefore, not in contact with, but separated from, the hernia. The inguinal canal was long, the inguinal rings were widely apart.

Who can doubt that in this case the rupture was dependent upon congenital patulency of the funicular portion of the peritoneal vaginal process? Had the rupture descended thus suddenly until it touched the testis, its development would certainly have been attributed to congenital imperfection; and if in the one instance it be admitted, why should it not happen in the other?

CASE 16.—*Inguino-scrotal rupture, developed during infancy, suddenly; the testis distinctly separated from the protrusion.*—A delicate infant, æt. 13 months, was brought to the hospital on account of irreducible scrotal hernia which caused much suffering. The left side of the scrotum was distended and red, and with an intestinal protrusion, but the testis was below it and quite distinctly separated from the rupture. In fact, the tunica vaginalis propria testis was perfectly developed. This time the rupture had been down some hours; the infant had vomited, and the tumour was painful.

This infant was eight months old when the mother first observed the rupture, and after a fit of violent crying; it formed a tumour in the scrotum, and it continued therein an hour. It returned into the abdomen on that occasion spontaneously.

The infant was soothed by the mother ; warmth and mois-
ture by means of flannels were applied locally, and in a
short time after admission the hernia had disappeared.

CASE 17.—*A large inguino-scrotal rupture, developed suddenly
in childhood.*—A very strong, robust, healthy male child, æt. 3½,
was brought to me with a large inguino-scrotal hernia on
the right side. Until he was two and three quarter years old,
there had been no appearance of rupture. This fact was
accurately ascertained. One morning the nurse observed the
swelling in the scrotum.

He was the subject of a large enterocele. The right testis
was at the fundus of the scrotum, and perfectly separate and
distinct from the hernial sac and its contents. The internal
abdominal ring could not be felt by passing the finger along
the inguinal canal from the external abdominal ring.

CASE 18.—*Inguino-scrotal rupture, developed in youth, with-
out exciting any particular trouble at the time.*—A healthy
boy, æt. 14, came into Guy's Hospital on account of an
inguino-scrotal hernia on the right side. The right testis was
in its normal position in the scrotum.

About one year and a quarter before, he observed a swelling
in the right side of the scrotum for the first time. The hernia
had never been irreducible. The protrusion occupied the funi-
cular portion of the vaginal process of peritoneum, and the finger
when passed through the external abdominal ring into the
inguinal canal did not reach the orifice of the sac. The de-
velopment of the hernia did not appear to have been attended
in this case with any sudden force, but to have passed down
into the scrotum without giving much inconvenience. Surely
there must have been a canal along which to pass.

CASE 19.—*Inguino-scrotal rupture, developed in adult life,
suddenly, and observed a very short time afterwards.*—A
strong, healthy, robust man, æt. 25, came into the hospital
on account of a right inguino-scrotal hernia, which reached
the testis at the bottom of the scrotum, although it was in a
separate sac. The hernia suddenly descended, for the first

time, one hour before admission, although he was not making any violent exertion at the time.

It was reduced by the taxis. Although the external abdominal ring was large, the internal was not within reach of the finger.

In this case we have such strong evidence that a rupture may descend as low as the testis at the fundus of the scrotum, and yet be separate from it, that it is impossible any longer to doubt the statements of patients when they relate such a fact. Observe, also, that the hernia descended without the influence of violent exertion, a fact strongly in favour of the existence of an open canal along which it might traverse.

CASE 20.—*Inguino-scrotal rupture, suddenly developed in manhood; the orifice of the hernial sac not to be reached with the finger, nor any hernial sac to be felt over the spermatic cord.*—A man, æt. 26, was riding a horse; the animal stumbled, and the rider, whilst holding on firmly and pulling up the horse at the same moment, felt a sudden violent pain in the right groin, as if the testis had been struck. He was strong, healthy, robust, and well developed. The right testis was at the fundus of the scrotum. On examination of the right side of the scrotum there was a swelling, which descended as low as the testis, but was separate from it. After rest the rupture was reduced by a surgeon. The external inguinal ring was sharp and well defined, the internal ring was not perceptible. After a most careful examination it was not possible to define the walls of any hernial sac. This patient had never before observed the slightest fulness even in the inguinal region.

Remarks.—Now, in the two cases just related one of three conditions must be admitted to have existed in order to explain the occurrence of rupture. Either the parietal peritoneum must have been forced down before the hernia into the scrotum to form its sac; or the rupture must have burst through the peritoneum, in which case it would be without its sac; or, there existed a serous canal, along which the rupture traversed. The reader may select the one most in accordance

with his views. I give the preference to the last; and, if that be accepted, what but the admission of a congenital defect—the non-closure before birth, or afterwards, of the funicular portion of the vaginal process of the peritoneum—will explain the occurrence?

A rather delicate boy, æt. 14, was in my ward in Guy's Hospital on account of cleft palate. At the internal inguinal rings on both sides there was a small protrusion into the injured canal when the abdominal muscles were strongly contracted. The hernia descended along the inguinal canal for about an inch, and did not reach the external inguinal ring. The testes were at the fundus of the scrotum.

This incomplete rupture had been observed some years, as long as the boy could remember, but had not increased lately. The case is introduced to demonstrate the possibility of a small portion only of the vaginal process remaining patulous. It is also remarkable that with the tendency to protrusion the rupture had not extended far along the inguinal canal, and especially, too, as a truss had never been used.

The following cases are examples of hernia into the funicular portion of the vaginal process of the peritoneum, which required more or less surgical treatment to effect their reduction:

Case 21.—*Inguino-scrotal rupture, suddenly developed in adult life and observed a few hours afterwards; spontaneous reduction.*—A healthy, robust, muscular carpenter, æt. 29, after working hard all day, walked a few miles in the evening. Whilst so occupied he felt a sudden pain in the right groin and side of the scrotum. The following day he came into Guy's Hospital with a right inguino-scrotal rupture. There was a large, tense, elastic tumour in the scrotum, which was painful when touched. The testis was at the fundus of the scrotum, and not in contact with the hernia.

He had never before this felt any swelling in the region. He was placed in bed seven hours after he had observed the rupture; two grains of powdered opium were administered, and warm fomentations were applied. He fell asleep, and during this time the hernia returned into the abdomen spontaneously, having protruded about twelve hours.

Before he was admitted into Guy's he had vomited, and the taxis had been ineffectually used.

In the same individual we may find examples of the two kinds of hernial sac; that one which depends upon the conversion of the unclosed funicular portion of the vaginal process into a hernial sac, and that one which is formed slowly by the continual pressure of the protrusion against the parietal peritoneum of the abdomen.

CASE 22.——A man æt. 44, the subject of double scrotal rupture, gave this history of the disease. He was ruptured first on the right side, at the age of sixteen years. The hernia formed at once, that is, descended into the scrotum suddenly. The hernia on the left side had been developed slowly, later in life, and it had been some time passing into the scrotum. Both testes were in the scrotum, and separated from the rupture. On the right side the inguinal rings were widely apart; on the left they were approximated. The bulk of the right protrusion was greater than the left.

CASE 23.——*Inguino-scrotal rupture, developed in boyhood, observed in manhood, in which the characteristics of protrusion into the funicular division of the vaginal process of the peritoneum were strongly marked.*——A healthy, robust clerk in a mercantile office, æt. 23, was admitted into Guy's in 1863, with well-marked signs of intestinal obstruction, caused by a left scrotal rupture. He had been suffering about forty-five hours before admission, during the latter period of which symptoms of strangulated bowel manifested themselves. Purgative medicines had been administered, but vomited. Cold had been applied locally. Chloroform was administered; but, in spite of the effects produced, the taxis did not avail in the reduction of the hernia.

On admission the left side of the scrotum was tense, but not so painful on pressure as it had been. There was not any impulse in the tumour when the patient coughed. The testis was posterior to the protrusion and separate from it.

The mother of this man stated that her son was ruptured

suddenly when he was about nine years old. He had never worn a truss, for the rupture did not often come down.

This man reached the hospital in a very low and depressed condition, so much so that his muscular system no longer acted with its usual power. He was placed in bed, warmth was applied to the tumour, and the house-surgeon easily reduced the protrusion, which consisted of omentum and bowel.

When the hernia was reduced I found that the external inguinal ring was very small indeed, especially when remembering that the patient had been the subject of hernia fourteen years. The internal inguinal ring could not be felt; nor by invagination of the hernial sac was I able to pass my finger into its orifice. The sac was certainly perceptible in the scrotum after making a careful examination of the structures of the cord, although, had I not known that the man was the subject of rupture, I could scarcely have been certain that what I did feel lying in front of the spermatic cord had ever formed the sac of a hernial protrusion.

CASE 24.—*Inguino-scrotal rupture, developed in boyhood; irreducible for some hours, but returned under the influence of chloroform.*—A healthy schoolboy, æt. 11, had observed a swelling on the right side of the scrotum, about four months before; I found him suffering with irreducible entero-epiplocele. The outline of the tumour was very striking. It seemed to project abruptly from the external inguinal ring, forming a rather globular swelling, and at the fundus of the scrotum the testis was discernible, producing a well-marked elevation and somewhat pointed termination to the entire tumour. The neck of the tumour was very small, and very firmly embraced by the pillars of the external inguinal ring. The abdominal muscles, of the right side especially, seemed to be permanently in violent contraction. He had been in suffering about eighteen hours before I saw him. The tumour was tense; it had never been so large before; he had vomited, although not for the last few hours; and he had obtained some repose during the night. Pressure of the swelling caused intolerable pain. We therefore administered chloroform, and when fully under its influence the protrusion was easily reduced.

In this instance the testis was quite separate from the hernia, which consisted of a recently protruded enterocele and a small epiplocele adherent to the hernial sac. The external inguinal ring was small, and the inguinal canal was too long to allow the orifice of the sac to be felt. We could not certainly decide, from the history this boy gave, that the hernia had formed suddenly, nor from his account had we any reason to believe that it was slowly developed. All the facts pointed to the conclusion, however, that the hernia occupied the funicular vaginal process.

CASE 25.—*Inguino-scrotal hernia, which did not, at the first descent, extend as low as the scrotum, but was retained in the funicular division of the vaginal process of the peritoneum by the small opening of the external inguinal ring.*—A strong, healthy, active carpenter, æt. 39, came to the hospital on account of an irreducible left inguino-scrotal rupture, which had been painful and in the condition observed about twelve hours. He was placed in a warm bath, opium was given, but reduction of the hernia was not effected until he was fully under the influence of chloroform.

The hernial tumour was not large nor very tense, but it was closely identified with the pillars of the external inguinal ring, the outline of the external pillar of which could only be felt behind the neck of the tumour. Although before the administration of the chloroform the neck of the sac did not appear to be very firmly girt by the abdominal muscles, which were not in active contraction, yet the body of the tumour was rendered less tense, in a very marked degree, when all voluntary and even involuntary muscular action was removed by the influence of the chloroform. First, the fluid which the sac contained disappeared, and the solids passed up with the usual jerk. The pressure employed was gentle, but the effort was chiefly directed to stretching the orifice of the sac by acting upon the body of the tumour.

The external ring was very small, the inguinal canal long, and the orifice of the sac was not within reach of the finger. The hernial sac was extremely delicate, and only to be discovered after the most careful examination. The testis was at the fundus of the scrotum and separate from the hernia.

This man was first ruptured when he was between nineteen and twenty years old, but the hernia never escaped through the external inguinal ring until this occasion, when he came into the hospital. Having felt pain in the abdomen, he put his hand to the scrotum, and found the swelling there for the first time. He had never worn a truss. Probably in this case the funicular division of the vaginal process of the peritoneum remained patulous, and admitted the rupture freely, which was prevented descending below the external inguinal ring for some time, on account of the smallness of that aperture. This condition we have repeatedly observed.

CASE 26.—*Rupture, developed eleven years before observation, and during youth ; large external inguinal ring, but the orifice of the sac not within reach.*—A rather slightly developed man, æt. 25, was admitted with irreducible inguino-scrotal rupture, with which he had been occasionally troubled from the age of fourteen years. He had worn a truss eleven years, that is, during the whole of the time since the formation of the rupture. The testis was at the fundus of the scrotum and separate from the rupture. The tumour was large, tense, and very painful when compressed. After a short repose in bed the hernia was easily reduced by the application of pressure alone.

The external inguinal ring was large and open, but I could not introduce my finger into the orifice of the sac.

CASE 27.—*Inguino-scrotal rupture, suddenly developed in manhood, observed six years afterwards ; characteristic form of the tumour; length of the inguinal canal; constriction by the orifice of the sac and its depth ; reduction after repose, induced by opium.*—A labourer, æt. 29 to 30, was admitted into Guy's with an irreducible right inguino-scrotal entero-epiplocele. The tumour formed a remarkably circumscribed mass, which projected sharply forwards immediately it had escaped from the embrace of the external inguinal ring, the margins of which could not be felt in front, although, on elevating the tumour, the point of the finger could be inserted behind its neck a little way into the inguinal canal. The neck of the tumour was very small, and, even with the addition of the spermatic

cord, it constituted only a hard line running along the inguinal region. The length of the interval between the inguinal rings was very marked. By pressure on the scrotum the internal ring and orifice of the hernial sac could be felt to recede more deeply into the abdomen, and it was impossible to fix the part with the fingers. The whole mass, when pressed, could be partially buried within the abdomen, but it did not induce the impression that any part of the contents of the sac could be passed through the orifice of the sac, for this structure seemed to embrace the rupture tightly. This examination was made when the man was under the influence of chloroform. There were no symptoms of strangulated intestine, and the rupture had been irreducible only a very few hours.

The man stated that six years before, when he was between twenty-three and twenty-four years old, he was suddenly ruptured, the hernia descending into the scrotum and causing great inconvenience immediately. He had worn a truss, but only at irregular intervals. There had been lately something always down, which, however, had not troubled him. On the present occasion he was using strong muscular exertion, when he felt pain in the rupture and found it larger than usual.

The right testis was separate from the hernia, and formed a projection at the fundus of the scrotum.

He was placed in bed, two grains of opium were taken, and warmth and moisture were applied locally. The patient fell asleep, and on awaking the enterocele was reducible, and the man himself accomplished it. The omentum continued permanently irreducible.

Afterwards neither the internal inguinal ring nor the orifice of the sac could be reached with the finger.

CASE 28.—*Scrotal hernia, developed suddenly in nineteenth or twentieth year of age; testis in scrotum; impediment to reduction the orifice of the sac; reduced eight and a half hours after descent, by taxis.*—A man æt. 34 was admitted in 1856, on account of a large right scrotal hernia. He gave the following history :—When in his nineteenth or twentieth year a hernia suddenly appeared after violent exertion. For the last seven or eight years he had worn a truss, but irregularly, and, five or six times before, considerable difficulty had been

experienced in reducing the protrusion. When admitted the hernia was large, tense, and painful, and had been down seven hours. The neck of the tumour was small in comparison with the size of the body ; the internal ring seemed deeply seated ; the testis could be felt at the bottom of the scrotum, and no signs of strangulation existed. From the sudden development of the hernia, and at such an early age, it is probable that this was a case of hernia into the funicular portion of the vaginal process of the peritoneum, the ventral orifice of which had never been closed, although the tunica vaginalis propria testis was perfect. The patient was placed in a warm bath, when in bed Pulv. Opii gr. ij were given, and ice applied to the tumour for an hour and a half. By the gentle application of the taxis the protrusion was reduced after being down eight and a half hours.

Case 29.—*Inguino-scrotal rupture, first developed in the groin, in adult life, suddenly, and taking some days to reach the scrotum ; a truss never worn, yet, after three years, the orifice of the sac and the external ring widely apart.*—A robust, healthy labouring man, æt. 30, came into Guy's Hospital with a right, oblique, inguino-scrotal rupture, which was developed when he was twenty-seven years of age. Whilst employed in carrying sacks of coals the rupture first appeared in the inguinal canal, and, as he gave little attention to the swelling, it soon descended into the scrotum—he believed in about a week. The descent of the hernia was not attended with much pain.

This patient was the subject of an entero-epiplocele ; the former reducible, the latter adherent to some part of the sac, and consequently irreducible. The testis was separated from the hernia, and was lodged at the fundus of the scrotum. He had never worn a truss. The neck of the tumour was long, and the distance between the inguinal apertures was greater than is usual in the slowly forming hernia of advancing years.

The following case is an example of this variety of inguinal hernia developed in infancy, becoming strangulated in early adult life, and requiring operation :

Case 30.—A well-developed, healthy, muscular man, æt. 20, was admitted into Guy's Hospital in 1847. He had been the subject of a hernial protrusion in the right groin *from infancy*. He had worn a truss for some years whilst at work. The hernia had never before given him any great trouble. During the night of the 8th the rupture descended after having removed the truss upon going to bed, and he was awoke by the pain it caused. Attempts were quickly made by himself and a surgeon to reduce the protrusion, but symptoms of strangulated intestine became early developed, and he arrived at Guy's Hospital on the morning of the 10th of May from Gravesend.

On admission there was a tumour in the right inguinal region, just emerging at the external abdominal ring, and quite distinct from the testis, which was at the fundus of the scrotum. The pain about the tumour was most severe; and its position, added to the tenseness, precluded any manipulation favorable to reduction of the bowel. Acute strangulation of the bowel being indicated by the local and constitutional symptoms, Mr. B. Cooper opened the hernial sac, incised its orifice, and returned the protrusion. The sac contained intestine, adherent and irreducible omentum; the former was deeply congested. It had been strangulated but for about thirty-six hours, and yet what urgent symptoms! The man died on the eighth day after the operation, of general acute peritonitis, with plastic and sero-purulent effusion. Three or four inches of the hernia, about a foot from the cæcum, showed traces of constriction, although its tissues were not disorganized. The hernial sac was small, rather thickened and elongated. The *orifice* was *very small*; its *margins* were *corrugated, rigid*, and *well defined*; the fibrous, annular induration which constituted the impediment to the reduction of the hernia being remarkably developed. *It was situated at the usual site of the internal* abdominal ring, and in this respect it formed a marked contrast with those cases of hernia taking place in adult life, which, in consequence of being so slowly developed and the tissues so relaxed, usually have the abdominal rings more closely approximated. A preparation of the sac described above is in the museum at Guy's Hospital, and numbered 2480[50].

Case 31.—*Hernia, developed in childhood; testis in scrotum; irreducible epiplocele, reducible enterocele; length of canal between the rings, depth of internal ring; impediment to reduction the orifice of the sac; fallacious appearance of the hernia being reduced; strangulation eighty-three hours; operation; omentum left in sac; cure.*—H. V——, æt. 43, a countryman, was admitted into Guy's in 1855, suffering under strangulated scrotal hernia. He travelled by railway from Farnham, and walked from the London terminus to the hospital. The rupture had given him pain eighty-four hours before admission, and symptoms of strangulation had existed eighty-three hours. The taxis had not been attempted.

He was a healthy, temperate man; had been ruptured as long as he could remember anything; was once before troubled with the bowel coming down, about eight or nine years since, and had never worn a truss.

Chloroform was administered; but, after making no impression upon the size of the tumour, I operated half an hour after his admission. The sac was exposed by making a single vertical incision, about three inches long, the centre of which was over the external abdominal ring. The peritoneal sac was carefully opened; some yellow serum escaped, and omentum; intestine and its mesentery were exposed. The omentum was universally adherent, and there was rather a large quantity. The intestine, a portion of ileum, was merely congested. The mouth of the peritoneal sac was incised. The omentum and peritoneal sac were united together at all parts, and not, as often appears, in bands only. It also seemed to form an imperfectly developed secondary sac, which somewhat retained the bowel. The internal abdominal aperture was very deeply placed and small; and I divided it with the hernia knife on my finger, as a director. Two distinct bands seemed to yield under the knife, and then the bowel was easily reduced. All the omentum was left in the sac, and the edges of the wound brought together, by sutures, over it. The opium and calomel plan of treatment was adopted, and the man progressed very favorably. The bowels were relieved on the fourth day after the operation. An abscess formed in the scrotum, from suppuration of a part of the omentum, which somewhat delayed the cure, although, at last, it was complete. The omentum by

degrees contracted, and he was able to wear a truss very comfortably.

This was one of those cases in which, the tunica vaginalis propria testis being perfectly formed, the funicular portion of the vaginal process of the peritoneum remains open after birth. This view of the case is supported by its history, the condition of the omentum, the length of the inguinal canal, and consequently· the depth of the internal abdominal aperture and orifice of the sac. I was much impressed with the manner in which the hernia could be pressed up just as if it was about to return into the abdominal cavity, as well after as before opening the peritoneal sac. The internal ring and hernia seemed to go backwards altogether, but the ·bowel would not go through the mouth of the sac until it was enlarged by incision.

Case 32.—*Rupture, developed in boyhood, observed in the adult; strangulated at forty-five years of age; length of the inguinal canal persistent.*—I operated upon a man æt. 45, on account of a strangulated oblique inguino-scrotal hernia, with which he had been afflicted since boyhood. This was the first time he had found any difficulty in returning the protrusion.

The orifice and neck of the sac were deeply seated; that is, the index finger was passed along the inguinal canal to reach the ventral orifice of the sac. It did not require division, but was sufficiently large to allow of the reduction of the hernia after the sac had been opened and a large quantity of serum had escaped. He was cured. The testis was at the fundus of the scrotum, and separated from the contents of the hernial sac.

Case 33.—*Rupture, developed in manhood, observed nine years subsequently, when it had become strangulated; operation; recovery.*—A healthy labouring man was admitted into Guy's in 1853, suffering with strangulated inguino-scrotal hernia on the right side. He was thirty-one years old, well formed, robust and muscular. The rupture was first noticed when he was twenty-two years of age. It appeared suddenly, but there

was no evidence that it was produced by an injury. He had
not worn a truss. The tumour was not large, but he said it
was larger than usual, and that there was always a slight
swelling. The testis was separate from the tumour, at the
fundus of the scrotum. The symptoms of obstruction were
well marked, but not severe. He had vomited; the tumour was
painful when handled, and it could be pressed into the
inguinal canal, although the contents of the hernial sac could
not be returned into the abdominal cavity. The diagnosis
was this :—An entero-epiplocele ; the former temporally con-
stricted, the latter permanently adherent, and therefore irre-
ducible. The variety of hernia inguino-scrotal, but escaping
into a congenitally open funicular portion of the vaginal
process of the peritoneum, and its reduction prevented by the
contracted mouth of that canal, or, in other words, the ventral
orifice of the hernial sac. Symptoms of obstruction only
having existed sixteen hours before admission, it was deemed
desirable to employ measures to assist the taxis. Opium was
administered, he was placed in a warm bath, ice was applied to
the tumour. There were no signs of forcible taxis having
been employed. The constitutional treatment was persisted in
for thirteen hours, but all manipulation of the tumour failed in
effecting reduction of the protruded bowel. Chloroform was
next administered, but the hernia was irreducible when its
anæsthetic effects were fully induced. We therefore now
divided with a scalpel the tissues external to the rupture, and
brought into view a large piece of omentum and a small
knuckle of ileum. The intestine had been strangulated
twenty-nine hours ; it was much congested with blood, but its
tissues were healthy. Gentle traction was made by an assist-
ant, who held the sac firmly, and I returned the bowel after
slightly compressing it, without cutting the ventral aperture
through which it had passed, and which was extremely deeply
seated, and far away from the external abdominal ring. The
congested and adherent omentum was left in the sac. Opium
was given after the operation; the man was convalescent three
days afterwards, and perfectly recovered.

CASE 34.—*Inguino-scrotal rupture, developed in manhood,
suddenly, and becoming strangulated two years afterwards ;*

urgent symptoms; operation; recovery.—In July, 1862, a healthy, labouring man, æt. 26, was admitted into Job Ward during the night, suffering acutely with strangulated right inguino-scrotal hernia. He had been ruptured two years, and he attributed its origin to striking his abdomen against the handle of a fire-engine. A truss had been worn since the accident. The testis was at the fundus of the scrotum, but separate from it. The illness, on account of which he sought admission at the hospital, commenced seven hours before he came there. Whilst running fast, the rupture descended behind the truss, which was imperfect. The tumour was larger than it had ever been before; it became very painful, and he soon after vomited. The constitutional symptoms were so urgent that to delay the liberation of the strangulated bowel was inadmissible, and the house-surgeon performed kelotomy in the middle of the night, when eleven hours only had elapsed since their commencement. An enterocele was exposed when the sac was opened; the bowel was purple; the sac contained no serum, and its ventral orifice required cutting. Chloroform was given, and the taxis used before having recourse to the cutting operation. The bowel was reduced after careful manipulation, the depth of the mouth of the sac rendering that operation somewhat difficult. During the next day the man vomited, the abdomen was tympanitic, and the pulse small and fast; his facial expression betokened acute peritonitis; there was great pain in the right iliac fossa. Opium was given freely, leeches were applied over the right iliac region, and the most sparing diet allowed.

For six days after the operation the condition of this patient scarcely permitted the most sanguine person to expect a successful issue, for he vomited stercoraceous matter; the abdomen was excessively tympanitic; he was often almost pulseless; the tongue was kept moist by putting pieces of ice in his mouth, otherwise it became dry and crisp, and the wound sloughed. During this time the diet consisted of milk, ice, brandy, and some arrow-root occasionally. Opium was sometimes given, which allayed restlessness. Warm fomentations were applied over the abdomen.

On the eighth day after the operation the bowels were slightly relieved, and some blood was mixed with the motion.

The very severe symptoms were less urgent, and his condition seemed to afford some hope of recovery. The next day he was allowed beef tea, but, slight tendency to diarrhœa appearing, the action of the intestinal canal was moderated by opium enemas. The patient now so rapidly improved that, on the twelfth day, he could take solid food, and he ultimately left the hospital quite well.

CLASS IV.—CASE 35.—*Scrotal hernia, the variety described by Sir Astley Cooper " encysted hernia of the tunica vaginalis," developed suddenly at age of thirty-six years ; testis in scrotum ; impediment to reduction internal ring ; strangulated bowel five hours ; operation ; cure.*—A man æt. 42 was admitted into Guy's Hospital in October, 1858, under my care. He was a temperate and very healthy looking man, although a painter by trade. He was suffering acutely with a large scrotal hernia on the right side, which had been down about three hours. He stated that he had been ruptured about six years, and that the rupture then appeared, *suddenly*, in consequence of a strain. Some difficulty was experienced in effecting reduction of the protrusion, and occasionally since that time it has given him much trouble and pain at intervals. A truss had been worn, but it was not very effective in keeping the rupture from falling down. The tumour was large, not of a very pyriform shape, although small at the neck, and it projected in a remarkable manner forwards. A little pressure on it gave him great pain. He was placed in a warm bath soon after admission, opium administered, and the taxis used, without reducing the size of the tumour.

Soon after this he vomited for the first time, and after the application of ice for about four hours I saw him. The manipulation of the tumour gave him so much pain that I advised him to inhale chloroform, and pointed out the necessity of operating for the liberation of the bowel, if it was irreducible, whilst under the full influence of that anæsthetic agent. To this proposition he gave a willing assent. Anæsthesia being fully induced, we could examine with greater effect the tumour. It evidently contained fluid as well as intestine ; the testis was distinctly felt behind the tumour, near the fundus of the scrotum; the external ring could not be felt clearly in front

of the neck of the tumour, but its external pillar was more than usually sharp posteriorly to it.   I made attempts to reduce the protrusion by gentle compression of the tumour, or of as much as I could grasp in the right hand, whilst with the left I fixed the neck of the sac at the rings.   The swelling became rather less tense, but reduction was impossible.   The entire mass was pushed upwards towards the abdomen, but the operator seemed to exert no influence upon it beyond the external abdominal ring.   The tissues in the inguinal canal all seemed to yield before the swelling, without having any fixed point.

I made a single linear incision over the front of the neck of the tumour, and exposed the external ring which embraced it, and was more than usually identified with its tissues.   Next a serous sac was opened, and the hernial sac exposed covered by a serous surface.   From this serous sac the tumour turned out, with the testis attached to and projecting from it at the lower and back part.   The whole tumour seemed to be hanging from the external abdominal ring.   The peritoneal sac was next opened ; serum tinged with blood escaped, and small intestine was exposed.   The intestine was deeply congested and slightly ecchymosed.   The internal inguinal ring was very deeply placed, and the mouth of the hernial sac was cut with the hernia knife, my index finger serving the purpose of a director.   The bowel was now easily returned into the abdomen.   On minute inspection of the peritoneal sac I observed at its posterior surface a distinct rent, about an inch long, through which the finger passed in a direction towards the iliac fossa.   If violent efforts had been continued to reduce the hernia by the taxis, the intestine would have escaped through this laceration into the iliac fossa.   This must have been one of those rare cases described first by Mr. Hey, of Leeds ('Obs. in Surgery'), and subsequently by Sir Astley Cooper under the name of " encysted hernia of the tunica vaginalis."

In the case just related the gentlemen around, as well as myself, were struck by the resemblance which the surface of the hernial tumour had to large intestine immediately after opening the first serous sac.

The wound was brought together with sutures, dry lint applied, and union by adhesion in great measure followed. Ten days after the operation a little pus came out from the depth of the sac.

Opium, in the form of Tinct. Opii ♏x—xv, was given every four hours, and low diet enforced, with ice and iced water when thirsty. Not an untoward symptom showed itself, and on the ninth day an enema of warm water relieved the rectum of some scybalæ. He was soon after this time quite well. When the scrotum had assumed more of its ordinary shape, the right side seemed rather flat and small; and, on inquiry of the man, he seemed to think that the right testis never descended very low down into the scrotum, but occupied a position very little below the external ring.

The preceding cases clearly demonstrate that the varieties of hernia associated with congenital defects of the vaginal process of the peritoneum occur at early periods of life; and as the affliction (rupture) is usually regarded as an inconvenience of and an attendant upon advancing years, such facts may be taken as militating against that doctrine. In another place,[1] however, I have shown that ruptures are more commonly developed as age increases, although, by constructing a table from the reports of the City of London Truss Society, so admirably arranged by Mr. Kingdon, it will be seen that of any large number of applicants for trusses, at all ages, in more than half the rupture was developed before thirty years of age.

In the Years	1860.	1861.	1862.	1863.
Inguinal Hernia: Males. { Before 30 years of age	1873	2090	2157	2316
After 30 years of age.........	1685	1895	2062	1994

Thus, we see by the table that in four successive years the development of inguino-scrotal hernia in youth is much more common than is generally supposed.

Every student of surgery well knows that all writers upon hernia describe two kinds of oblique inguino-scrotal rupture, in relation to their manner of development, their anatomical

[1] Holmes's ' System of Surgery,' vol. iv, p. 228.

peculiarities, and the age of life at which they first occur. In this paper we have already related those cases of rupture which are developed in early life, and in which the protruding viscus passes along a congenital serous canal, which becomes then the hernial sac.

That kind we may designate Number 1 for the sake of brevity.

Another kind, or that variety which is developed in adult life or old age, is slowly formed, and in its descent into the scrotum forms its own sac, by pushing the parietal peritoneum of the abdomen before it, we may term Number 2.

The differential diagnosis between these two kinds of oblique inguino-scrotal rupture will then be formed by the following features :—Number 1 appears suddenly, often passes at once into the scrotum upon its first appearance, and does not linger in the inguinal canal. Number 2, on the contrary, is slowly formed, is observed to point at the internal inguinal ring, may be watched as it traverses the inguinal canal, is seen to emerge at the external inguinal ring, and at last descends as low as the testis at the fundus of the scrotum.

Number 1 is an affliction peculiar to early life. It is developed in infancy, childhood, youth, and early adult life— at that age when the healthful condition of the tissues precludes those changes which usually precede the protrusion of the viscera of the abdomen from their natural cavity. Number 2 is associated with middle adult life, advancing years, and old age, when, from the natural decay of the tissues of the body, their textures are not able to resist the pressure induced by the abdominal viscera against the parietal peritoneum, and it becomes pushed through the abdominal apertures to form a sac for the hernia.

The relation of the testis to the protrusion varies in Number 1. Sometimes it is in the same sac as the hernia, at the fundus of the scrotum, or that organ may not have descended from its fœtal position, or it may be reposing in the inguinal canal. At other times, the tunica vaginalis propria testis being perfect, the hernia occupies its own distinct sac, and is separate from the testicle. In Number 2 the testis is always within its own proper envelope, and quite distinct from the hernial protrusion.

The configuration or outline of the scrotal tumour frequently indicates the variety of hernia. In Number 1 the tumour projects in a remarkable manner from the external outlet of the inguinal canal; directly the rupture escapes from the embrace of the pillars of the external inguinal ring, it swells out into a globular form, which by degrees assumes a more pyriform shape if serum be effused into the sac. The tumour seems also to have a tendency to ascend and overlay the external inguinal ring in some cases; but it can be pressed downwards, when the margins of that aperture may be clearly defined, since they seem not to be so intimately identified with this variety of hernial sac and its coverings as that which forms slowly. The neck of the tumour is generally small, and, at its fundus, the testis often produces a very characteristic contour. Lastly, it occasionally happens that the tumour resembles the form of an hour-glass. When this outline occurs it frequently indicates the existence of a constriction in the body of the sac, independently of that one which may be produced by its orifice also. In Number 2, the figure of the tumour is pyriform; the testis is not a prominent object, although it may be always felt, and the neck of the tumour is usually large. As it passes out of the external inguinal ring, the tissues of that aperture and of the tumour are closely identified, and the structures composing the spermatic cord may be generally easily recognised. Any deviation from the pyriform outline usually depends upon variation in the thickness of the sac at different parts, or upon accidental bands or adhesions attached to the walls of the sac.

Such are the distinctive marks when the protrusion fills the hernial sac.

When the rupture is returned into the abdominal cavity certain anatomical facts are equally well marked. The traces left behind are well worthy of notice. In Number 1 the sac is very thin, and it often requires great care and delicacy in manipulation to detect any traces of a sac at all. We all know how thickened this structure becomes, and how distinctly it may be felt in old scrotal hernia. The external inguinal ring is sometimes so small, and therefore well developed, in young men, that the index finger is with difficulty inserted; and, if sufficiently large to admit freely the finger, the internal

inguinal ring is not within reach. This condition exists even
after men have been ruptured many years. Thus, the inguinal
apertures are not approximated, and the inguinal canal retains
its normal length. But in Number 2 the rings are large,
the inguinal canal no longer exists, the rings are brought
closely together, and the orifice of the hernial sac lies only
just within the external inguinal ring. In conformity with
this arrangement, the parts of the hernial sac more imme-
diately influencing the reduction of a hernia, or constituting
an impediment to its replacement within the abdomen, may be
noticed. In Number 1, the orifice of the hernial sac, cor-
responding with the normal position of the internal inguinal
ring, and being, therefore, deeply seated, and out of reach of
manipulation, offers a striking contrast with the situation of
the same portion of the sac in Number 2. Its dimensions
are generally very small in 1 large in 2. In one the
inguinal canal is long, in the other short. So that in these
anatomical differences we have abundant facts to explain the
causes of the impediment to the reduction of the protruded
viscus from a sac constituted as in Number 1, whilst,
on the other hand the reason for the facility with which the
reduction of ruptures from sacs of the class Number 2 is
effected, becomes equally capable of demonstration. In Number
1, the rupture has to retrace its steps through a small ex-
ternal inguinal ring, a long, narrow, inguinal canal, and the
small, deeply seated orifice of the sac ; in 2 it has merely to
traverse, as it were, almost one aperture only—that one through
which the finger freely passes into the abdominal cavity,
and by which often many structures in the vicinity may
be distinctly and accurately felt, although at some dis-
tance.

We may here briefly recapitulate the facts which aid the
formation of a correct diagnosis between the two kinds of
oblique inguinal hernia. The mode or manner in which the
rupture descended must be first accurately ascertained ; the age
at which it was first noticed should be clearly made out ; the
relation of the testis to the rupture should be noted ; the con-
figuration of the hernial tumour must be observed ; and, lastly,
the anatomical arrangement of the neighbouring parts in rela-
tion to the sac, the situation of its orifice, and the length of

the inguinal canal, are points which require to be determined with precision.

It seems unnecessary to dilate upon the treatment of the cases. Most of them tell their own tale, but that which they seem most forcibly to teach us is the risk to life which attends the condition of the bowel termed strangulation. To avoid the necessity for a cutting operation would always be the great object of a surgeon, and this can only be done by carefully refraining from the employment of force in the application of the taxis, by administering those medicines which induce repose or sleep, relaxation of the tissues, and complete muscular inaction.

In conclusion, we have only to add that it is impossible to exhaust the whole of this subject in one paper. There are points connected with the comparative statistics of the two kinds of oblique inguinal hernia, with their treatment, palliation, or in relation to their radical cure and comparative results of treatment, which may, perhaps, furnish the subject matter for another communication.

EXPLANATION OF PLATE,

Illustrating Mr. Birkett's paper on Inguinal Hernia.

Fig. 1. A drawing made from a recent dissection, to show the open vaginal process of the peritoneum as it frequently appears directly after birth in a full-grown infant.

    a. The mouth of the right vaginal process of the peritoneum, into which a bristle is inserted. Its tubular neck is seen extending into the scrotum, near the fundus of which it bulges, to envelope the testis. It is represented as slightly inflated.

    b. The left vaginal process of the peritoneum laid open along its anterior surface, to show its continuity with the parietal peritoneum of the abdomen.

    c. The left testis and epididymis.

At *d* a slight contraction of the tube is frequently seen. It is at this point that the sides of the tube become adherent together, to form the tunica vaginalis propria testis.

Fig. 2. A drawing of the vaginal process of the peritoneum of a child, from a preparation in the museum at Guy's Hospital, No. 2368.

a. The mouth of the serous canal, through which a piece of blue glass is passed. Below the mouth the canal is cut open, to show—

b The testis.

At *c* a contraction may be seen, which, when the edges of the incision were joined together, must have produced an annular contraction of the canal, and therefore an opening existed by which the cavity of the funicular division of the vaginal process of the peritoneum communicated with that division, which, in this case, only partially enveloped the testis. In this instance the tunica vaginalis propria testis was imperfect.

Fig. 3. For this illustration I am compelled to copy Camper ('Icones Herniarum,' plate x). It demonstrates the two divisions of the vaginal process of the peritoneum.

a. The mouth of the funicular division.

b. The testis exposed to view by cutting open the anterior surface of the tunica vaginalis propria testis; its parietal layer, tunica reflexa of Sir Astley Cooper.

c. The vessels of the spermatic cord exposed to view by cutting open the tunica vaginalis propria funiculi.

d. The septum between the two vaginal processes.

In this instance the tunica vaginalis propria testis was perfect; the canal of the tunica vaginalis propria funiculi was patulous; an opening leads from it into the abdomen, and a protrusion of the abdominal viscera might take place into it.

Plate

Fig. 1.
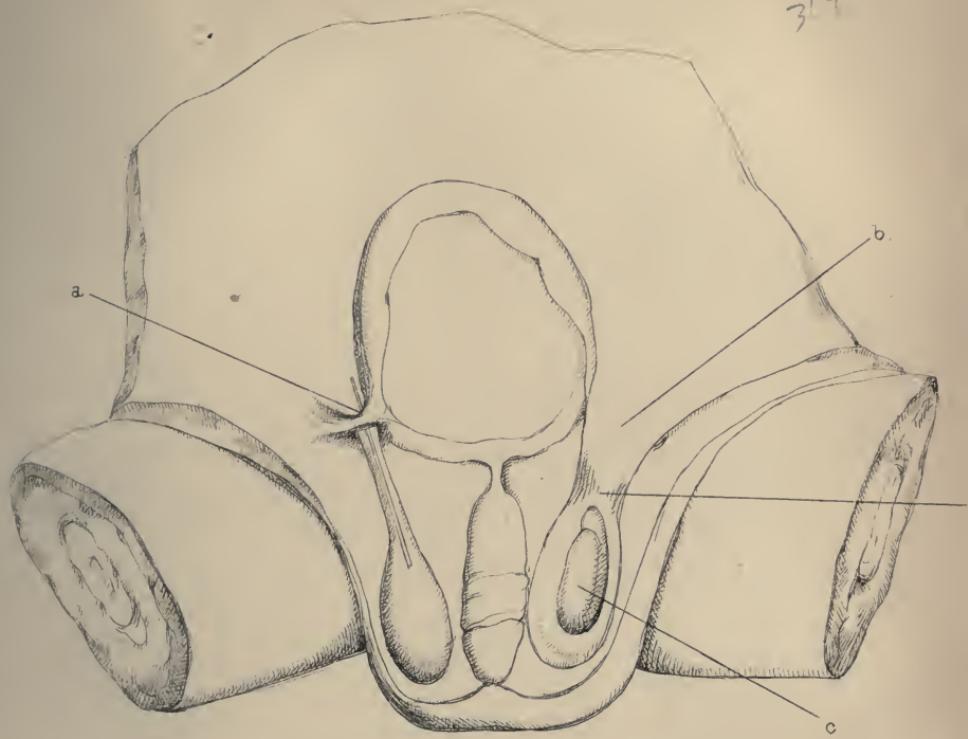
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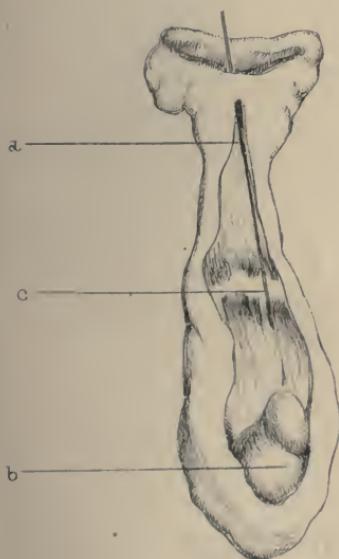
Fig. 3.
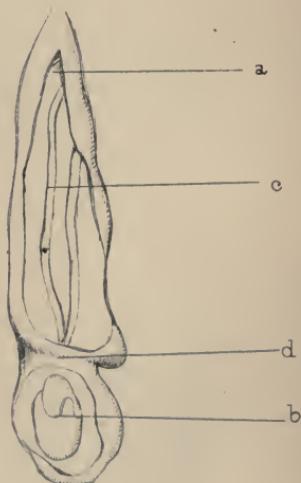
SO-CALLED AMYLOID DEGENERATION.[1]

By F. W. PAVY, M.D., F.R.S.

THE first-recorded recognition of the lardaceous or so-called amyloid degeneration appears to have been made by Dr. Hodgkin, in the year 1832. In vol. xvii of the 'Medico-Chirurgical Transactions' there is a paper of Dr. Hodgkin's, entitled "On some Morbid Appearances of the Absorbent Glands and Spleen." In this paper it is remarked that the morbid alterations of structure which were about to be described were probably familiar to many practical morbid anatomists, but they had not been hitherto made, so far as Dr. Hodgkin was aware, the subject of special attention. Dr. Hodgkin appears to have had before him instances of the lardaceous or so-called amyloid disease, but it is to be regretted that he simply described what he saw, without giving it a name. The principal object of his paper, however, seems to have been to point out the connection between the glandular and splenic affections.

Dr. Bright, in vol. iii of the first series of 'Guy's Hospital Reports,' published in 1838, refers, in a paper on "Abdominal Tumours," to the affection of the spleen which, he says, has been particularly pointed out by Dr. Hodgkin, as connected with extreme disease of the absorbent glands. He speaks of it as a disease, apparently of a malignant nature, though varying from the more usual forms of malignant disease. According to his description, the spleen becomes more or less infiltrated

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[1] The contents of this communication formed the substance of a portion of the Gulstonian Lectures delivered at the Royal College of Physicians in 1863.

through its whole substance with a white matter, having almost the appearance of suet.

Dr. Carswell, also, in his work on 'Pathological Anatomy,' 1838, notices this affection, and looks upon it as of a malignant character.   Amongst his varieties of scirrhoma, he says, "it," the heterologous deposit, "may be disseminated uniformly throughout the texture of an organ, which is converted into a solid substance resembling a slice of raw or boiled pork, and is then called by the French *tissu lardacé*."   Upon looking to the description of his plates, however, it seems that the term lardaceous was applied to other conditions besides that which we now characterise as the lardaceous disease.

Dr. Budd, in the first edition of his work on 'Diseases of the Liver,' published in 1845, conspicuously refers to the lardaceous affection ; but, in the second edition, which appeared in 1852, a much more complete description of it is given.   He speaks of it under the name of scrofulous enlargement of the liver.   After stating that the appearance was well expressed by the epithet "waxy," which had been applied by many pathologists to represent the affection, and observing that Laennec and others had been led to regard the deposit as consisting of a variety of fatty matter, Dr. Budd remarks that in the most striking examples of the "waxy" liver which he had met with the foreign matter was of an albuminous and not a fatty nature.   "They were examples, not of fatty degeneration, but of what may be termed, from the most common cause of the condition, the scrofulous enlargement."   Mention is made of a case recorded by Portal, and of another by Abercrombie, as cases of this disease.

Rokitansky belonged to those who regarded the lardaceous disease as a species of fatty degeneration.   "In the ordinary fatty liver," he says, "it is a normal fat, for the most part rich in elain—in some varieties of fatty liver, the waxy liver, a more consistent fat, containing stearine and cholesterine."

Towards the close of 1853 a discussion (recorded in the 'Monthly Journal of Medical Science,' 1854) took place at the Physiological Society of Edinburgh, on a specimen of waxy spleen exhibited by Dr. Bennett.   Dr. Bennett stated that when he had first become acquainted, several years ago, with the waxy degeneration of tissues, he had supposed that it was

an ultimate form of fatty alteration. He was now satisfied, from numerous observations, that it was a primary alteration of the cells, and, though frequently associated with fatty degeneration, was not essentially connected with it. Dr. Gairdner was familiar with the waxy condition of organs, which, though never very accurately described, he said, had been noticed by various writers. In waxy liver the organ was extremely slow to decompose, and its specific gravity was notably increased, being sometimes, in portions, above 1080. The glandular epithelia were compressed, irregular in form, and had atrophied nuclei. They presented, also, a peculiar horny refraction, giving the idea of their being composed of a substance much denser and more resistant than the normal elements met with in the cells. This condition of the liver was common in scrofulous, syphilitic, and other chronic exhausting organic diseases. In the purely fatty degeneration the specific gravity was not raised, but reduced; he had seen it as low as 1005. In Dr. Gairdner's opinion, the morbid condition was due to a peculiar modification of the proteine compounds. Dr. Sanders remarked, in regard to microscopic appearance, that, under high magnifying powers, the normal corpuscles of the Malpighian bodies of the spleen were found converted into, and replaced by, masses of a colourless, dense, highly translucent, homogeneous material. At first these masses appeared to exhibit no structure of any kind, but, on careful examination, the outlines of irregular misshapen cell-forms might be distinguished.

The lardaceous disease had thus now begun prominently to engage the attention of pathologists. Different views had, from time to time, been expressed regarding its nature; first, that it was a form of malignant disease, though Hodgkin dissented from this, without, however, pronouncing an opinion of what it was; next, that it was a kind of fatty degeneration; and then, in which Dr. Budd and the Edinburgh school coincided, that the degeneration was of an albuminous instead of a fatty character. At this phase of its history an entirely new feature of interest was given to it by the announcement of Rudolph Virchow, that he believed it to consist of an amyloid or starch-like degeneration. Since this announcement the affection has attracted much attention, and been the subject of discussion in many different quarters.

It was not by a sudden thought that Virchow hit upon the conclusion that the lardaceous disease consisted of an amyloid degeneration. Men have always been found ready to dilate upon the disparities between the animal and vegetable kingdoms. Clinging tenaciously to the doctrine that it is the province of the plant to build up, and of the animal to destroy, they have been unwilling to admit, until compelled by the strength of the evidence that science has gradually revealed against them, that the animal enjoyed the power of constructing organic compounds. After the point had been yielded with respect to the limitation of the production of fat to the vegetable organism, it was still held that starch, and its allied carbo-hydrates, were products peculiar to the vegetable world. The presence or absence of starch was, indeed, looked upon as affording a mark of distinction between the two kingdoms, and was thus advanced as an element of classification in the case of doubtful beings. Cellulose, however, an isomeric congener of starch, was discovered in 1845, by Carl Schmidt, as a constituent of the tunic of ascidian molluscs. Sugar was shown by Bernard, a few years later, to form a product derivable from the liver. An animal dextrine, or, as Bernard called it, " matière glycogène," was next discovered as the source of the liver-sugar, and was also recognised as existing in other textures besides that of the liver. To crown all, starch itself, even in the form of starch-corpuscle, has since been said to exist in the brain.

The fact of cellulose having been detected as a constituent of the body in the lower animals, induced Virchow to look for it in the tissues of the higher. Failing to find it in the gelatinous matter of the umbilical cord, where he first sought for it; and, afterwards testing the bodies which had been recognised by Purkinje in the brain, and called amylaceous, on account of their morphological resemblance to starch, he obtained the reaction with iodine that is given by starch. Similar-looking bodies, which also behaved the same with iodine, were then discovered in the prostate. Directing his attention to morbid as well as healthy structures, Virchow next announced that he had obtained the cellulose reaction with the deposit belonging to a waxy spleen. From first regarding this deposit as colloid and next as albuminous, Virchow, on account of the reaction thus observed with iodine, now looked upon it as of a

starchy character, and has since continued to speak of it as an amyloid degeneration.

Such are the chief historical data belonging to the lardaceous or waxy disease, and such its connection with the amyloid degeneration of Virchow. The object here in view being to inquire into the true nature of this affection, and see if the opinion of Virchow can be sustained, we must start by having clearly before us the chief characters of the various bodies concerned. I will therefore briefly pass them in review.

Vegetable starch $(C_{12}H_{10}O_{10}.)$—This material forms one of the most abundant products of the vegetable kingdom, and seems to be specially stored up for being drawn upon as required by the processes of growth. It gives a deep-blue coloration with iodine, which disappears upon the application of heat, and may be made to suddenly reappear by pouring the heated decolorised liquid on a cold surface.

Vegetable cellulose is isomeric with starch, and was first described by M. Payen. It constitutes the elementary membrane forming the walls of the cells and vessels of plants. It gives no reaction with iodine alone, but produces a violet or blue colour with iodine and the addition of sulphuric acid or chloride of zinc.

Vegetable dextrine is also isomeric with starch, from which it is derivable in various ways. It constitutes an intermediate substance between starch and sugar. Iodine produces with it a deep wine-red coloration, which is affected by heat in the same way as what has been mentioned for starch.

Animal cellulose is obtainable from the tunic of ascidian molluscs, and is called " tunicine " by Berthelot. Its composition is identical with the cellulose of plants, viz., $C_{12}H_{10}O_{10}.$ According to Berthelot, tunicine is insoluble in water both cold and boiling, alcohol, and acetic acid ; and is not attacked by concentrated potash, even on boiling, nor by the dilute acids. For conversion into sugar, dry tunicine is to be treated with strong sulphuric acid, without any application of heat. A gradual liquidation of it takes place, and the liquid is to be poured drop by drop into one hundred times its weight of boiling water, and kept at a boiling temperature for an hour. The acid is then to be saturated with chalk, and sugar will be

found in the resultant liquor. Treated successively with strong sulphuric acid and a solution of iodine, Berthelot says it assumes a pale-blue colour.

Animal dextrine.—This is the glycogen of Bernard. It is also known as amyloid substance and zoamyline. Eugène Pelouze's analysis gives the following as its composition :— carbon 39·8, hydrogen 6·1, oxygen 54·1=100·0 ; which corresponds to the formula $C_{12}H_{12}O_{12}$. It exists in some of the tissues of the higher as well as the lower animals, and was discovered by Bernard whilst conducting his investigations upon the production of sugar in the liver. It was in September, 1855, that he made known to the Académie des Sciences that a material existed in the liver which could be shown to undergo transformation into sugar after death ; and in March, 1857, he announced that he had succeeded in isolating this sugar-forming substance.

We have here a substance which undoubtedly belongs to the saccharine or carbo-hydrate group ; but M. Sanson has attempted to refute the doctrine of its being produced by the animal organism, asserting that it is a constituent of the blood and flesh as well as the liver ; he regards the only source of it to be the vegetable kingdom, saying that the liver separates and stores it up more largely than other organs. " The herbivora," says M. Sanson, " find the amylaceous principle in their food. This they transform into dextrine, one portion of which they use, the other accumulates in the tissues. The carnivora find in this accumulated dextrine the source of their sugar without having to elaborate it."

The report of a commission, composed of MM. Bouley, Poggiale, and Longet, to the Académie de Médecine, stands opposed to the assertions of M. Sanson. In dogs fed upon meat no amyloid substance was found except in the liver. The amyloid substance was only found in the liver of the herbivora, excepting when these animals were fed upon a diet rich in amylaceous materials. In a large number of examinations, they only once found the amyloid substance in butcher's meat, but constantly met with it in the flesh of horses. It is to be remarked that Sanson's original experiments were conducted upon horses at the Veterinary School of Toulouse.

In the observations that I have conducted myself upon dogs

restricted to an animal diet, the lung and muscular tissues have yielded a small quantity of a substance which was coloured red with iodine, and convertible into sugar by the action of saliva —a substance, therefore, that presented the characters of dextrine. No such substance was obtained from the spleen, pancreas, or kidneys; and, as regards the blood, my own experience is in direct opposition to M. Sanson's assertions as far as the dog is concerned.

Bernard also says that there are two tissues besides the liver which, under certain circumstances, may contain glycogen (amyloid substance) in adult life, viz., the muscular and the pulmonary. In hybernating animals, he states, during the cold season, glycogen exists in the muscle and lung-substance, but disappears when the animal is awake and active. In ordinary well-fed mammals and birds, also, glycogen may be sometimes noticed to accumulate in muscles kept in a state of rest, to disappear afterwards under functional activity.

In early—embryonic—life this amyloid substance exists much more extensively diffused. Bernard first recognised it in certain cells of the placenta, which he thus regarded as possessing a glycogenic function that made up for the absence of a glycogenic function in the liver during the earlier period of embryonic life. M. Rouget, it appears, next discovered its presence in the epithelial cells of the skin and alimentary mucous membrane of a fœtal pig. He had been led to search for it here from observing that the cells of the amnion and placenta which contained it were nothing else than epithelial cells. Bernard now read a memoir (4th April, 1859), at the Académie des Sciences, entitled "De la matière glycogène considéré comme condition de developpement de certains tissus chez le fœtus avant l'apparition de la fonction glycogenique du foie." Here, recognising the presence of glycogen in the skin and its epithelial appendages, alimentary surface, surface of ducts of glands opening into the alimentary canal (but not the glands themselves), respiratory surface, and genito-urinary surface, Bernard looks upon it as a material concerned in the development of the limiting membranes. During the development of the internal organs, glandular as well as others, except the muscular, the amyloid substance is not similarly to be met with. Even in the liver it is not primarily found; for it is not

until about the middle of intra-uterine life, when its histological development is finished, that the liver, it seems, is found to contain it.

In some of the molluscous animals I have observed that an exceedingly large quantity of amyloid substance is present. In the oyster (*Ostrea edulis*), the liver is copiously charged with it, and in the mussel (*Mytilus edulis*) it is not only present in the liver, but likewise in the layer of mantle lying immediately underneath the shell. When the mussel is poor, as after spawning, this layer is thin, transparent, watery, and contains comparatively little amyloid substance; but at other times it is thick and opaquely white or yellowish, and in this state is exceedingly rich with it. The amyloid substance, therefore, seems to form here a store of material for being drawn upon in time of need.

This amyloid substance (the amyloid substance of physiology) of which I have been speaking is a true member of the amylaceous group, and Virchow's amyloid matter must not be confounded with it. But I have now arrived at the point to take into consideration the nature and properties of the latter.

There are two varieties of the amyloid matter of Virchow enumerated—first, the corpuscular, which is encountered in the nervous system, the prostate, and pulmonary tissue; and, secondly, the granular, which is found in organs and tissues that have undergone the lardaceous or waxy degeneration.

It is now about ten years ago that the attention of the profession was aroused by the startling announcement that starch—veritable starch-corpuscles were to be met with in the human brain. It appears that Virchow had been examining the brain with reference to the disputed point as to the existence or non-existence of a distinct lining membrane in connection with the ventricles. He found that a layer of connective tissue was interspersed between the epithelial cells and the nervous elements, which layer he regarded as consisting of nothing more than an extension beyond the nervous elements of a portion of the interstitial tissue which is everywhere present between them. Now, it is in this layer that the little bodies which had been previously recognised, and called *corpora amylacea* by Purkinge, are situated; and these Virchow—led, doubtless, by their

physical resemblance to starch-corpuscles, to test them—found assumed a blue colour on being treated with iodine. From this reaction the astonishing announcement originated that starch-corpuscles existed in the cerebral centre.

Virchow says of these *corpora amylacea,* that, " morphologically, they present themselves either as perfectly circular bodies, with regular concentric layers, or their centre is a little on one side, or we find twin bodies ; or, again, the bodies are more homogeneous, pale, with a dim lustre, like fatty substances. Cautiously treated with a dilute solution of iodine, they assume a pale-bluish or grayish-blue colour, though a great deal certainly depends upon the proper degree of concentration of the test. If afterwards we very cautiously add sulphuric acid, we obtain, when the proper effect is produced, a beautiful blue, which is best shown by allowing the test to act very slowly." It is stated that the best effect is produced by placing a drop of sulphuric acid at the edge of the covering-glass of the preparation, and allowing it to remain for twelve to twenty-four hours.

On account of sulphuric acid being required to bring out fully the blue coloration with iodine, Virchow regarded the *corpora amylacea* as consisting, chemically, rather of cellulose than of starch. Mr. Busk, who gave a translation of Virchow's original paper in the ' Quarterly Journal of Microscopical Science,' and added the results of his own investigations, considered them, however, to consist of starch, as he found them to act upon polarized light in the same way as starch, and to present, in fact, all the chemical, structural, and optical properties of starch as it occurs in plants. The corpuscles he met with varied in size from less than a blood-disc to $\frac{1}{500}$th of an inch or more. Messrs. Bristowe and Ord state that the *corpora amylacea* of the brain they examined presented no cross with polarized light, and that they thus differed in their optical properties from starch.

In an article " On Starch as a Constituent of Animal Organization," in the ' Edinburgh Monthly Journal ' for March, 1858, and also previously in August, 1855, Dr. Carter speaks of having recognised starch-corpuscles as a constituent of almost all the tissues belonging to almost all kinds of animals. Rouget, of Paris, from his investigations

upon this point, gives to these corpuscles an extraneous origin, pointing out how frequently starch-corpuscles are liable, from chance diffusion, to fall under the eye of the observer in conducting microscopic examinations. This may probably contribute to reconcile the contradictory statements that have been made regarding the optical properties of the bodies described as *corpora amylacea*.

The *corpora amylacea*, we are to observe, must not be confounded with the concentric spherical corpuscles of which the brain-sand is composed. It is said that these latter have an organic matrix, which is coloured of a deep yellow by iodine and sulphuric acid, and which is obviously nitrogenous. The *corpora amylacea*, according to Virchow, exist only in the substance of the *ependyma ventriculorum* and its prolongations. In this he includes especially the lining of the cerebral ventricles and the transparent substance in the spinal cord described by Kölliker as the *substantia grisia centralis*. They are found most numerously, he says, where the ependyma is thickest, as on the fornix, septum lucidum, and in the stria cornea in the fourth ventricle. In the spinal cord the substance corresponding to the ependyma lies in the middle, in the gray substance, in the position where the spinal canal exists in the fœtus. Similar bodies have been met with in the higher nerves of sense, as the olfactory, acoustic, optic (Rokitansky), and retina (Kölliker). In the case of the retina, Virchow admits that bodies occur which are allied to the *corpora amylacea*, but says that chemical tests have as yet failed in producing the reaction.

No one has succeeded in transforming these *corpora amylacea* into sugar, or in isolating them and determining their ultimate composition. Their microscopic appearance and their coloration with iodine form, therefore, the only grounds for regarding them as identical with cellulose or starch. But many bodies besides starch present a laminated appearance under the microscope ; and the production of a blue coloration with iodine is not, as I shall show further on, a property exclusively enjoyed by starch. More conclusive evidence than has as yet been advanced is needed before Virchow's opinion with regard to these bodies can be properly accepted.

Prostatic corpuscles.——In the prostate of the adult man a number of bodies are to be found which present a laminated

character like the bodies of the brain to which I have
just referred. These vary in size from small microscopic
objects to particles easily visible to the naked eye. Accu-
mulating as they do under certain circumstances, they form
what are known as prostatic concretions. Some prostatic
corpuscles are colourless, others are more or less of a reddish-
brown colour. It is especially amongst the larger ones that
colour is seen. When coloured, the centre is darker than the
periphery, thus causing it to look like a nucleus. Not un-
frequently two or more centres are embraced by a common
envelope. " With iodine," says Virchow, " these prostatic
bodies very frequently assume just as blue a colour as vege-
table starch does. When much albuminous matter, however,
is mixed up with the amyloid, the colour is green instead of
blue, from the admixture of the blue of the amyloid with the
yellow of the nitrogenous substance. Many prostatic bodies,
though quite analogous in structural appearance to the others,
only become yellow or brown on the addition of iodine, and,
consequently, differ in chemical composition." " So far," adds
Virchow, " these formations are distinguished from the little
amyloid corpuscles of the nervous system, which one and all
assume a blue or bluish-gray colour on the addition of iodine."
" As growth proceeds," writes Paulizky, " the amyloid in the
prostatic corpuscles gradually disappears, and in such of them
as have advanced to the dimensions of concretions by the ad-
dition of calcareous and pigmentary matter, the starchy re-
action is no longer discernible." Rouget says that the
colourless corpuscles are rendered yellowish-green or green by
iodine, whilst those naturally of a brown tint do not change
colour. In addition to what has been mentioned, Paulizky
is said to have obtained sugar from most prostatic corpuscles
that have given a yellowish-brown colour with iodine. This
result, if confirmed, would speak strongly in favour of the
presence of an amyloid or starch-like principle; but one is
puzzled to know how, with minute bodies like the prostatic
corpuscles, it could be ascertained that certain of them were
transformable into sugar, there being no micro-chemical test
for this substance. I have tried upon six prostates containing,
as shown by the microscope, the prostatic corpuscles, to procure
sugar by the aid of sulphuric acid, but failed in each case to

discover the slightest indication of its production. My own experience of the colour occasioned by iodine is that it is rather an olive-brown that is produced ; and this is the colour represented by our artist, whom I directed in one case to depict on paper exactly what he saw. In the specimens I have examined I have not obtained anything that could be said to constitute a blue.

The third variety of corpuscular amyloid matter of Virchow is formed by the *pulmonary corpuscles*. These are described as a rare form of corpuscle, of a similar kind to the prostatic. They have been shown by Friedreich to occur in several conditions of the lungs.

We come now to the granular or amorphous variety of Virchow's amyloid matter, which constitutes a material that is only met with as a morbid deposit. It never occurs, like the previous variety, in the form of bodies with concentric markings. The tissues, Virchow says, become infiltrated with a substance of an amyloid nature, which exhibits the peculiarity that it never becomes blue under the influence of iodine alone, but assumes a peculiar yellowish-red, which, however, it is true, has in many cases a slight tinge of reddish-violet. It displays pretty regularly a real either perfectly blue or violet colour when the application of iodine is followed by the cautious addition of sulphuric acid. With such behaviour, Virchow further says, it is less nearly allied to starch, and more akin to cellulose ; but it differs, again, from cellulose in becoming coloured with iodine alone.

It is upon this ground—the coloration with iodine—and this ground alone, that the notion is founded of our having in the lardaceous disease a deposit of an amyloid character ; no other feature of resemblance has been brought forward to support its identity with the true amyloid carbo-hydrate. Undoubtedly a well-marked coloration is produced by the action of iodine upon lardaceous organs ; but, according to what I have seen, the following is the effect that is observed.

On applying to the cut surface of a lardaceous organ a strong solution of iodine, the parts pervaded by the deposit gradually assume a dark colour, whilst the healthy material remains only slightly tinged by the reagent. The stronger the solution, or the larger the quantity of iodine brought in

contact with the deposit, the deeper the colour that is produced. With a lardaceous organ, freshly obtained from the postmortem room, I have found that the colour has disappeared by the following day. When the specimen, however, has been cleansed by soaking in water and spirit, the coloration has continued persistent. This difference is probably attributable to the effect of decomposition, which is actively advancing in the one case and not in the other. Ammonia, which forms one of the products of decomposition, and has an affinity for iodine, would take it from the deposit, and thus cause a removal of the colour. Free iodine is required for the colouring effect to occur. Decomposition does not easily influence the lardaceous deposit; for a specimen of a diseased organ may be smelling offensively from putrescence, and still the reaction with iodine is to be obtained. Cutting an organ into slices and exposing them to moderate heat to dry does not, either, disturb the lardaceous material, for on afterwards moistening the specimen the usual coloration with iodine is to be obtained. I have found this plan of drying convenient, as well-marked instances of the lardaceous disease are not of everyday occurrence in the post-mortem room, and I have thus been enabled to supply myself with material for study whenever a leisure opportunity occurred. Drying in the water-bath or -oven may also be resorted to; and if the specimen—say of liver, be powdered and agitated with a solution of iodine in a test-tube, the colour may be contrasted with what is produced by a specimen of fatty or ordinary liver treated in a similar way. The difference to be observed is exceedingly marked.

With the concurrence of Dr. Wilks, the curator of our museum, I have been afforded the opportunity of submitting to chemical examination portions of two of the museum preparations, representing extreme instances of the lardaceous disease. Both were in a thoroughly cleansed state, and had been in spirit for some years. One consisted of a piece of liver pervaded throughout with deposit; the other, a portion of spleen with the deposit collected in little sago-grain-like nodules, which could be easily turned out from their recesses between the trabeculæ. The following are the results obtained.

Some of the liver was dried in the water-oven, and afterwards pulverized. On being treated with iodine, the pulveru-

lent part became of a reddish-brown colour, whilst the shreds of vessels presented a reddish tinge only. The subsequent addition of sulphuric acid produced a blackening effect on the powder. With the iodine and chloride of zinc, the colour assumed was of a reddish-brown character. The powder, after being boiled with ether, alcohol, and water, still presented the same behaviour with iodine. Portions were boiled with moderately dilute nitric acid, glacial acetic acid a little diluted, ammonia, and solution of potash. The last was the only agent that dissolved it. The nitric acid, acetic acid, and ammonia, being poured off, and the powder being washed and dried, was found still to give the colour reaction with iodine. To the solution effected by potash an excess of acid was added, which threw down a finely divided precipitate, that proved difficult to collect on a filter. This, as far as could be ascertained, gave no reaction with iodine.

Slices of the specimen of spleen were treated with iodine, and the nodules of lardaceous matter gradually assumed a darker and darker colour until they became black. This colour was not removed by soaking in water, nor by exposure to air and allowing the specimen to dry up. The effect of boiling the coloured slices in a test-tube with water was to lead to a gradual disappearance of the colour. During the first few moments no change was perceptible; then the colour began to fade, and iodine vapours were evolved from the tube until all colour was removed. As in the case of the liver, the only solvent of the lardaceous masses of the spleen was a solution of potash. No sugar could be obtained by boiling the material with sulphuric acid or subjecting it to the transformative influence of saliva.

From the observations I have conducted it has seemed to me that the coloration of the lardaceous matter effected by iodine has depended upon a simple absorption of the reagent. My impression is that the coloration is not the result of a definite, coloured product, like the product of union between iodine and starch or iodine and dextrine, but is due to iodine as such, which is absorbed much more greedily, as it were, and held more firmly by the lardaceous deposit than by ordinary forms of animal matter. Unlike, in other words, the reaction of iodine with starch, dextrine, or the amyloid sub-

stance of physiology, the colour appears to depend on the iodine alone, its intensity being regulated by the amount absorbed or deposited.

Undoubtedly, according to my experience, the colour, in arriving at black, passes through shades of *red and brown and not of blue*. This I have observed not only during the heightening of the colour, but likewise during its fading under the influence of exposure to boiling in a test-tube.

There is another feature of disparity between the colour produced by the action of iodine on starch (dextrine agrees in this respect with starch) and on the lardaceous deposit. In the case of the former the colour is *immediately* removed by the application of heat, but may be instantly restored by the influence of cold. In the latter the colour only *gradually* fades with the evolution of iodine as ebullition is kept up, and cannot afterwards be restored by the influence of cold.

It is evident that the lardaceous deposit must possess a much stronger attraction for, or power of absorbing, and afterwards of holding iodine, than ordinary animal matter ; for, whilst under simple exposure to the air, a gradual evolution of the iodine and disappearance of the colour takes place with the one, such is not the case with the other. A boiling temperature, indeed, is required to disengage iodine from the lardaceous matter.

Heinreich Meckel, in opposition to Virchow's view, has advanced the opinion that the lardaceous disease is due to the deposition of a peculiar fat, more or less identical with cholesterine ; and hence he has suggested that the morbid condition should be called the cholesterine disease. From the reaction of iodine and sulphuric acid on the fresh organ, and not the extract, Meckel thinks that the information is sufficiently precise to enable him to distinguish four substances, which he has named respectively speck-roth, speck-violet, cholesterine, and speck-kalk. The exact nature of the fat which forms the peculiar constituent of these compounds, he admits, is unknown, but says that no other fat gives the same reaction with iodine.

At an early period of paying attention to this subject I was myself drawn, by independent observation, in the same direction as Meckel. From the first starting out I considered that the great object to be attained was to isolate the sub-

stance giving the peculiar properties to the lardaceous organ. Without being acquainted at the time with Meckel's results, I extracted, with spirit, a crystallizable fat, which gave the reaction of the lardaceous deposit with iodine and sulphuric acid. The idea immediately presented itself to me that it was a fatty deposit, as Laennec and Rokitansky had considered, which we had to deal with in the lardaceous disease. This idea was strengthened into almost a conviction when I saw that Meckel had also previously arrived, from chemical examination, at a similar conclusion. Pushing investigation, however, further, I found that the reaction with iodine and sulphuric acid was not peculiar to the fat I had extracted; that, in fact, other fats were capable of producing precisely the same reaction.

If a little tallow or lard be smeared over the surface of a white saucer or plate, and be then covered with a solution of iodine, a gradual darkening of the fatty surface takes place, like what would occur with an absorption of iodine. If now, after a few minutes, the iodine solution be poured off, and the fatty surface be rinsed over with water, then a few drops of strong sulphuric acid being allowed to fall upon the reddened fatty matter, brings out a beautiful colour, varying between violet, blue, and purple. The pure stearine and margarine behave like tallow and lard, but stearine produces a better result than margarine. With stearic acid, wax, and spermaceti, I could obtain no reaction, but when melted with a little olive oil, and then used, a coloration ensued. The result seemed to me afterwards to be contingent on the condition of the surface. Stearine melted on a saucer does not behave like stearine that has been smeared or rubbed upon it. In the former case the surface is close and shiny, and the iodine does not seem to be able to penetrate; in the latter the surface is rough and apparently porous, so as to permit of a penetration or absorption of the iodine. With regard to the coloration that is subsequently produced by sulphuric acid, I just throw out the hint whether it may not possibly depend upon a precipitation of the iodine in an insoluble form.

Cholesterine is not affected by the iodine solution alone, but the subsequent addition of sulphuric acid brings out a deep-blue tint. Sulphuric acid, also, without the iodine, produces a

beautiful colouring effect with cholesterine, but a deep wine-red is the tint assumed.

From what has been stated, then, there is nothing peculiar in the reaction of the fat of the lardaceous organ. Indeed, the reaction of the lardaceous deposit with iodine cannot be due to a fatty matter, because the same reaction occurs when all fat has been extracted. It is possible that in some cases the presence of a fat may have contributed to the reaction with iodine and sulphuric acid, but this does not alter the position assumed.

If the material belonging to the lardaceous degeneration be neither an amyloid nor fatty principle, the problem still remains open for solution to determine what it is. The arguments that I have to bring forward are in favour of the notion, which has been broached by others, that we have in reality to deal with an albuminous or nitrogenized body.

In the first place, its reaction with iodine cannot be taken as affording any evidence against its being a nitrogenized body ; for, supposing it to be such, it would not form the only nitrogenized material capable of behaving with this element more or less in a starch-like way. Narceine, a constituent of opium, which may be obtained in a crystallized form, produces a well-marked blue coloration when treated with iodine, which coloration heat and alkalies destroy. Now, narceine is undoubtedly a nitrogenized body, its formula, derived from Couerbe's analysis, being $C_{28}H_{20}NO_{12}$.

Composition of Narceine (Couerbe).

Nitrogen	.	.	.	.	4·76
Carbon	.	.	.	.	57·02
Hydrogen	.	.	.	.	6·64
Oxygen	.	.	.	.	31·58
					100·00

Chitine is another nitrogenized body which gives a colour reaction with iodine. This principle was discovered by Odier ('Journal de Pharmacie,' 1823), and forms the animal basis of the skeleton of articulated animals, such as insects, crustaceans, myriapods, and arachnidans. The shell, for example, of the crab or lobster, after the calcareous matter has been removed by an acid, yields a flexible substance, which becomes of a deep-

blue or bluish-black colour with the iodized chloride of zinc, and of a reddish-brown, approaching black, with a solution of iodine. Chitine is an exceedingly insoluble substance, resisting the influence of almost all reagents. Its composition is as follows:

Composition of Chitine (Schmidt).

Nitrogen	.	.	.	.	. 6·01
Carbon	.	.	.	.	. 46·35
Hydrogen	.	.	.	.	. 6·44
Oxygen	.	.	.	.	. 41·20
					100·00

Schmidt's formula for chitine, deduced from the above analysis, is $C_{18}NH_{15}O_{12}$. This formula has been split up into $C_6NH_5O_2 + C_{12}H_{10}O_{10}$, and chitine, thus represented as composed of an isomeric of cellulose in combination with an isomeric of muscular fibre. But although Rouget says that, by boiling with five times its weight of caustic potash for about half an hour, and then moistening with a little water, he has succeeded in modifying chitine, and converting it into a substance analogous to starch or dextrine; and although by chemical agents a sugar analogous to glucose has been obtained from it, yet the nitrogen cannot be separated without the destruction of the body. There is nothing, therefore, to preclude us from looking upon chitine as an ordinary nitrogenized principle, for even from hæmatine Lehman has succeeded, by chemical means, in obtaining sugar.

According to Messrs. Bristowe and Ord, a colour approximating to that produced by the iodine test upon the lardaceous liver was given by the action of iodine upon a specimen of diphtheritic effusion and the villi of a villous cancer they examined. The resemblance, indeed, was far closer, they say, than between the reaction of any specimen of lardaceous liver and that of true starch or cellulose. Several specimens of morbid fibroid tissue and other morbid products were also examined, but with these only a faint-yellow colour with iodine was obtained.

It does not follow, as a necessary consequence, therefore, that because we get a colour reaction with iodine the substance

must belong to the amylaceous series. The position may be analogous to that of hydrosulphuric acid in its behaviour with arsenic, cadmium, and tin, in the inorganic kingdom. With solutions of each of these metals hydrosulphuric acid throws down a yellow precipitate. Would it be right for the chemist to decide, upon the evidence afforded by the reaction of sulphuretted hydrogen alone, that he had a solution, for example, of arsenic present?

Carl Schmidt, from elementary analysis, has come to the conclusion that the amyloid substance of Virchow, both of health and disease, is in reality a nitrogenized substance of an albuminoid character. Virchow replies that, as regards the analysis of the *corpora amylacea* of the brain, we cannot attach the slightest importance to it, because it is based on an error. Schmidt says, for example, that he selected for his analysis a choroid plexus (from the human brain) rich in *corpora amylacea*. But *corpora amylacea*, continues Virchow, are never found in large numbers in these plexuses; indeed, it would seem doubtful whether they are ever found there. It is suggested that Schmidt's analysis applies to the calcareous bodies in their early or albuminous stage, before their impregnation with earthy matter. In reference to Schmidt's analysis of the amyloid spleen, Virchow says that it is well known how little the results furnished by the analysis of whole organs are to be depended upon. Only, he argues, when we have discovered the means of isolating the amyloid substance, shall we be able to come to any definite conclusion with regard to its nature.

Freidreich and Kekulé conclude that the lardaceous spleen contains a considerable quantity of cholesterine, but that this is not the cause of the reaction with iodine and sulphuric acid. They also decide that it contains no matter allied chemically to starch or cellulose. In an analysis of a portion of spleen so affected by amyloid degeneration that nearly every trace of primitive tissue was obliterated, they found about as large a per-centage of nitrogen as exists in albuminoid substances. The purest-looking amyloid was selected for the analysis. It was extracted with water, alcohol, and ether, and the vascular fragments were, as far as practicable, separated by mechanical means. The following is the result they obtained:

Nitrogen	.	.	.	.	15·04 per cent.
Carbon	.	.	.	.	53·58 ,,
Hydrogen	.	.	.	.	7·00 ,,

For the sake of comparison with the above, I will furnish the result of Mulder's analysis of albumen belonging to the serum of blood :

Nitrogen	.	.	.	.	.	15·83
Carbon	.	.	.	.	.	54·84
Hydrogen	.	.	.	.	.	7·09
Oxygen	.	.	.	.	.	21·23
Phosphorus	.	.	.	.	.	0·33
Sulphur	.	.	.	.	.	0·68
					100·00

An analytical examination has been made of the lardaceous liver and spleen belonging to Guy's Museum, which were referred to when the colour reaction of iodine was being spoken of. The results, as will be seen, are confirmatory of the conclusion arrived at by Schmidt, and Freidreich and Kekulé.

. The spleen was most favorably circumstanced for yielding a trustworthy result. The lardaceous matter was accumulated in little isolated nodules, which could be easily picked out from their recesses amongst the trabecular tissue. These nodules were as large and larger than a mustard-seed, and Virchow's objection about the fallacy of examining whole organs would not apply to them, as they could be obtained separate from the tissue belonging to the organ. Enough of these lardaceous nodules were picked out to make an analysis for nitrogen ; but there was not enough of the preparation that could be spared to yield also sufficient for the quantitative determination of the other elements. The preparation was perfectly white, showing that it had been thoroughly cleansed from blood. It had been soaking in spirit for upwards of six years. The lardaceous nodules, after being dried, were reduced to powder. This was easily accomplished, as they were very friable, being perfectly free from admixture with vessels or trabecular tissue. Dr. Odling was kind enough to undertake their analysis for me, and, according to his results, they contained 14·97 per cent. of nitrogen.

In the specimen of liver the lardaceous matter was diffused

amongst all the textures of the organ, so that it could not be obtained in the same isolated state as with the spleen. The organ was affected to an extreme degree. The specimen had been preserved as a preparation for seven years in spirit. A portion of it was dried, pounded, and sifted, and the minutely powdered part only, taken for examination. This was first of all boiled with ether, absolute alcohol, and water. The following was the per-centage of extracts yielded :

Ethereal extractives	.	.	.	. 7·38
Alcoholic ,,	.	.	.	. 0·82
Aqueous ,,	.	.	.	. 8·20
Insoluble residue	.	.	.	. 83·60
				100·00

The insoluble residue, which was found to give the iodine reaction like the original specimen of liver, was submitted by Dr. Odling to analysis. The following are the figures furnished to me, as representing the proportions in 100 parts :

Nitrogen	.	.	.	. 15·02
Carbon	.	.	.	. 49·88
Hydrogen	.	.	.	. 6·88
Oxygen, sulphur, phosphorus .	.	.	—
Ash	.	.	.	. 1·33

From the evidence thus before us the lardaceous deposit appears to be a nitrogenized material. There seems certainly no sufficient justification for regarding it as of an amyloid nature, and the term amyloid degeneration ought, therefore, properly speaking, to be abandoned. From Robin's statement, Virchow's view does not receive credence in Paris. Looking upon the deposit as nitrogenous, the terms lardaceous and waxy are not less objectionable, chemically speaking, than that of amyloid; but there is this difference with regard to them,— that the former were suggested by the physical appearance which the degenerated organs present; the latter was proposed to denote an alleged chemical constitution, which has been by no means established. Whilst the terms lardaceous and waxy are, therefore, in one respect, pertinent, the term amyloid would seem to fail to apply even upon the ground that led to its employment.

The difficulty investing this subject may be considered to arise out of the insolubility of the lardaceous deposit. In its character of insolubility it resembles chitine, and there is also a similarity of behaviour between the two with iodine. The lardaceous matter, indeed, appears more allied to chitine, which is likewise a nitrogenized body, than, it seems to me, to anything else.

Whatever view may be taken concerning the chemical nature of the lardaceous material; pathologically, we have to deal with the deposition of a substance which destroys the functions of the parts invaded : gland-cells can no longer perform their glandular functions, nor vessels properly subserve to the nutrition of the tissues or the secretion of fluids. The lardaceous deposit is one which simply accumulates in the structure affected, and shows no disposition to undergo organization.

In reference to the manner in which the morbid material is deposited, the statement of Virchow is that the parts become infiltrated with a substance which has been conveyed to them from without—a view, he says, which derives essential support from the fact that nearly always, when the change declares itself, a considerable number of organs are found to be affected. The only example where an independent development of the disease has been noticed by Virchow is in permanent cartilage. Some cartilages, particularly in people somewhat advanced in life, give, he says, the peculiar coloration when subjected to the iodine test. Now, as these cases occur in individuals, who, in the rest of their bodies, manifest nothing of the kind, Virchow considers that we have really here to deal with a direct transformation, and not an importation from without.

There exists but a single observation—and upon this, it may be said, no reliance can be placed—pointing to the recognition of lardaceous matter in the blood. A physician of Toronto, it appears, in compliance with the wish of a patient suffering from epilepsy, had submitted his blood to microscopic examination, and had discovered in it some peculiar pale bodies. Afterwards, hearing of Virchow's discovery of the *corpora amylacea* of the brain being coloured by iodine, he again examined the blood of his patient, and still found the bodies, which are said to have exhibited the amyloid behaviour with iodine !

It is in association with the scrofulous and syphilitic dispositions that the lardaceous deposit most frequently occurs, and it seems to have some special connection with chronic disease of the osseous system ; for in a collection of thirty-six examples of lardaceous disease, brought forward by Dr. Wilks in the ' Guy's Reports ' for 1856, twenty-seven were cases in which a history of some decided affection of the osseous system existed. All that can be said about the deposition is that it must be looked upon as the result of a depraved manifestation of nutrition.

There are but few parts of the body in which the lardaceous degeneration has not been at different times observed. Its occurrence was first noticed in the spleen, liver, and kidneys, but Virchow says that he afterwards succeeded in finding it in the lymphatic glands, throughout the whole of the digestive tract, in the mucous membrane of the urinary passages, and finally even in the substance of muscular organs—the heart and uterus, as well as in the interior of cartilages. There are cases, it is stated, where the whole extent of the digestive tract from the buccal cavity to the anus does not contain a single minute artery which is not affected with the disease. In such, the intestines are pale, and have a gray, translucent, sometimes wax-like, appearance. A little iodine being brushed over the surface, a number of densely aggregated, yellowish or brownish-red spots are soon seen to start up, the interjacent mucous membrane merely looking yellow. The red points are the villi of the intestine, and the microscope shows the walls of the small arteries, and even the capillaries, and sometimes also the parenchyma, to have been coloured.

. As regards histological change, the following is what is described as taking place. The smallest arteries are said to form the earliest and most frequent seat of the disease. And, of the elements of the vessels, the deposit is first encountered in the circular fibres of muscular tissue. Ultimately, in place of the fibre-cell, a kind of spindle-shaped flake is seen, in which no structure is discernible. In the case of the liver the liver-cell becomes homogeneous, the nucleus and cell-wall gradually disappear, and at last nothing but an absolutely homogeneous, slightly shining body, or simple flake, is to be perceived. Amongst the altered contents of the Malpighian bodies of the

spleen, Virchow found round or slightly angular particles lying thickly packed together. These particles were derived from the metamorphosis of the usual lymph-cells belonging to the bodies, than which, however, they were larger. Handfield Jones says the Malpighian bodies are found to contain a quantity of rather highly refracting matter, in the form of irregular fragments of homogeneous texture. In the lymphatic glands the invasion of the disease is much the same as in the spleen : the small minute arteries on the one hand, or the mass of minute cells forming the essential substance of the glands on the other, may be seen undergoing the change. In the kidney it is the vascular element that is seen to be affected. The Malpighian bodies, sometimes the afferent arteries, and next to these, when the disease is very severe, parallel arteries lying in the medullary structure, may be brought into view by the application of iodine. The kidney may be even to such an extent affected that an appearance of artificial injection is given on the employment of the iodine.

With these microscopic changes there is a physical alteration in the appearance of the organ which is visible to the naked eye. The lardaceous liver, when sliced, presents a semi-transparent, homogeneous, or structureless appearance. It is of firm consistence, so that the thinnest slice can be taken off; and it can be cut into definite-shaped pieces, that retain the form given. It is heavy in weight, and in this respect presents a striking contrast to the fatty liver. It is not easily susceptible of decomposition, and, although putrescence may have set in, the reaction with iodine is still afforded. Dr. Wilks, in speaking of the lardaceous liver, says, " When the disease is advanced no trace of structure may be perceptible, but when less advanced the lobules may be mapped out in a remarkably clear and defined manner, owing to the adventitious material being deposited within the lobule, in and amongst the cells, causing it to appear as a distinct transparent body, and made more definite also by a slight fatty degeneration of its margin; for this fat, being mixed with the lardaceous matter, produces an opaque white material, which maps the lobules out in the most perfect manner." In the ordinary form of lardaceous spleen translucent bodies are seen occupying the place of the Malpighian corpuscles, and looking like

miliary tubercles. They vary from the size of a pin's head to that of a hemp-seed. . Christensen has aptly compared them to the appearance of sago-grains in soup. There appear to be other forms of affected spleen, in which other parts of the organ are pervaded with the deposit. The lardaceous spleen is not necessarily enlarged, although it is usually so. The characters belonging to the lardaceous kidney are hardness, firmness, translucency, and uniformity of texture. The Malpighian bodies and vessels are brought into view on the application of the iodine test.

Clinical disturbances, as might be expected, accompany the anatomical changes noted. There is a general cachectic condition of the body. Ascites supervenes upon the occurrence of the disease in the liver and spleen, and albuminous urine, in the kidney. A considerable number of the cases of Bright's disease, especially the chronic ones, are assignable to the lardaceous degeneration. The spleen and lymphatic glands being invaded, must exercise a prejudicial effect upon the formation of the blood. It is not, therefore, surprising that under such circumstances an anæmic condition, with its concomitants, should be perceived.

I.

TWO CASES

OF

CHRONIC IMPAIRMENT OF HEARING

IMPROVED AFTER

SCARLET FEVER AND ERYSIPELATOUS SORE THROAT.

II.

DISSECTION OF THE EAR IN A CASE OF DEAFNESS

IN A THIRD MEMBER OF THE SAME FAMILY.

By JAMES HINTON.

An improvement of hearing following scarlatina, or other acute affections of the throat, and apparently produced by them, is an event that has been known, or at least supposed, sometimes to occur. I have more than once met with cases in which there seemed sufficient evidence, taken in a general way, to establish that an acute disease of this kind and relief of a chronic deafness had in some way coincided, but I am not aware of any instances in which the particulars have been accurately detailed. The following two cases, therefore, occurring in members of the same family, who were under observation before, during, and after the attack, may, perhaps, prove interesting, especially since they are supplemented by the dissection of a third case, also occurring in the same family, in which a form of deafness presenting some features of similarity was present.

CASE 1.—H. R——, æt. 29, a surgeon, perfectly healthy, though not robust.

November, 1863.—For several years, probably since a severe dissection wound five or six years ago, has been gradually becoming deaf in the right ear; during the last three or four years he has noticed a dulness in the left ear also. He requires to be addressed in a voice slightly raised, and loses a great part of general conversation. Hearing distance for a watch (audible beyond six feet) right side four inches, left seven inches. It was heard, however, when placed on any part of the skull. A constant humming noise had existed from the commencement of the deafness, and had increased with it. During a noise, as when riding in a carriage, hears conversation much better; on testing this point, it was found that the watch was somewhat better heard on either side while another sound was also presented to the ear; while, *e.g.*, a vibrating tuning-fork was held near it. Acute sounds were heard better than grave ones. The membrana tympani presented very little abnormal. On the right side it was clear; but, instead of a single bright spot at the lower part, there was an irregular reflection of light from different portions of its surface. The lower part of the malleus was not very distinguishable. The left membrane was quite transparent, the concavity of its surface rather great. The Eustachian tubes, as tested by the otoscope, were pervious. Natural cerumen lined each meatus. No treatment was employed. At a previous time small blisters had seemed to do some good. The hearing did not vary.

The diagnosis seemed to lie between a rigidity of the tympanic mucous membrane and a derangement of the nervous apparatus. He was tall, of sanguine temperament, and excitable. A younger brother, taller than himself, a hard student, was also becoming deaf. (See Case 3.)

December 28th, 1863.—On this day he was taken ill with a severe attack of scarlatina. In the course of a fortnight he was recovering; skin desquamating; no albuminuria. During his illness his deafness had increased; but as he advanced towards convalescence he not only regained this loss, but became conscious of hearing better than before. This was evident also to his friends. During the severity of the sore

throat there was a slight painful feeling in the ears; he distinctly felt "the inflammatory process extending into them," most in the right side.

January 16th.—Ears examined. The right membrane looked particularly shining and transparent. The bright spot very distinct. On the left side the membrane was very dull, and the outline of the malleus was obscured. Each meatus desquamating.

18th.—On the left side the epidermoid lamina of the membrana tympani was raised up in parts, as if it were beginning to desquamate in patches. The right membrane moved freely on inflating the tympanum with closed nostrils.

As the patient gained strength his hearing continued to improve, and the tinnitus became less. On April 5th the hearing distance of the watch was on the right side seven inches, left fourteen inches. The membranes clear and bright; the bright spot on left side somewhat double in form.

May 14th.—Had continued to improve, nor had the fatigue and emotion consequent on the almost sudden death of a brother done more than partially throw him back, and somewhat increase the tinnitus again for a time. Watch heard—right nine inches, left twenty inches. Membranes normal. Throat now healthy, though irritable. He feels that he inflates the left ear much more freely than the right, and more freely also than before the fever. The sounds produced by inflation are normal; during the act the watch is heard less distinctly. Pressing on the meatus on either side increases the sound of his own voice and of a tuning-fork placed on the head. Hears conversation quite easily. On attending a public dinner about this time he heard all that was said.; on a similar occasion in the previous November he heard nothing.

June 20th.—Hearing distance of watch—left twenty-six inches, right four or five. Pressing on the right meatus increased the sound of his own voice less than on the opposite side. The watch therefore appears to be heard less perfectly on the right side than at the last note; but, according to the patient's own perception, the advance in this ear is quite as decided, and as great in proportion, as in the left. He is no longer apt, as was formerly the case, to turn the left ear when addressed.

The cause of the improvement in this case, though not demonstrable, is, perhaps, little open to doubt. In all probability, it is to be sought in the change effected in the mucous lining of the tympanum, by the inflammatory affection in which it participated. The only visible change that took place was a desquamation of the epidermis of the membrana tympani, to which little importance can be attached, both because there was no previous evidence of thickening of that membrane, and because it doubtless takes place in every severe attack of scarlatina. The view that most strongly suggests itself is that a desquamation or some deeper structural change took place also in the tympanic mucous membrane, and that this change restored the impaired mobility of the structures involved in that cavity.

As tested by the watch alone, there is less appearance of improvement in the right than in the left ear, while the inflammatory action was most felt in the former. This might throw a doubt upon the explanation suggested, were it not that the results given by the watch are so frequently out of accord with the real power of audition possessed by the organ. Tested by the perception of speech, it appears rather that the ear in which the inflammation ran the highest has received the greatest proportionate benefit.

While the improvement of the right ear in respect to the watch was at its highest point, pressure on the meatus had its normal effect (as it has on the left ear also) in increasing the perception of sounds conveyed through the bones of the head. This effect appears since to have become less marked, the hearing distance for the watch having also fallen. From this fact there may be drawn a confirmation of the view that a rigidity of the parts within the tympanum is the cause of the deafness.[1]

The second case, which bears a very interesting resemblance to the former, is that of the patient's mother.

CASE 2.—Mrs. R—, æt. 55, generally of good health, and of active habits. She had been deaf, but not to a very great degree, for several years, the right ear being the worse. In this ear

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[1] The further discussion of this point I must defer to a future time. The reader interested in it may refer to a paper by Dr. Lucae, in Virchow's 'Archiv,' vol. xxv.

the affection commenced after an attack of typhus fever, at the age of eighteen. During the fever she became quite deaf on both sides, and the right ear never perfectly recovered. During the last three or four years it had become worse, and she habitually turned the left ear in conversation; this also, however, had gradually become imperfect. No examination of the ears had been made.

January 23rd, 1864.—After nursing her son through scarlatina she became ill, with severe sore throat and great prostration; not, however, having the character of scarlet fever, but rather presenting symptoms of a slight degree of pyæmic poisoning.

The throat affection painfully implicated the ears also; swallowing caused as much pain in them as in the throat; speaking also pained them, the voice "rang" in them; no external tenderness. While the soreness and swelling of the throat were at the worst she could hear much better, and as she recovered the improvement became greater. The right ear, also, formerly the worse, became much the better one. The watch was heard—right two feet, left five inches. The voice, and all other sounds, were heard with ease. A tinnitus of a ringing character, to which she had been frequently subject, had not been present since this change.

Right ear.—Meatus normal; membrana tympani bright, but having somewhat of an irregular or crumpled appearance; no red vessels visible; malleus very prominent superiorly, and around its head a shining white mass, looking like layers of epidermis. Eustachian tube pervious, though not freely, air entering with a slight creaking sound. Inflating the tympanum gives no pain; the membrane does not visibly move during it.

The left meatus occupied by an extremely hardened mass of impacted epidermis, only a portion of which, owing to her residing at a distance, has been as yet removed.

June 25th.—The improvement in hearing continues, although the depression of strength is very great. Right membrana tympani bright and smooth; malleus prominent, the mass which surrounded its head is gone. A thinned and depressed spot anteriorly. The membrane moves on her inflating the tympanum; the action does not affect the hearing. Throat healthy.

It is certainly remarkable that a deafness dating, in a mild form, from typhus fever at the age of eighteen, and existing to a very considerable amount for three or four years, should have been so thoroughly relieved, at the age of fifty-five, by an attack of sore throat, which attack, moreover, was accompanied by great general debility, even at a time when the improvement in hearing was most decided. It hardly admits of question that the cause of the deafness was mechanical, and that it lay in the mucous membrane of the tympanum. No exact observation of the state of the ear previous to the attack was made, and therefore it cannot be positively said whether the Eustachian tube was then impervious, or whether any marked thinning of the membrana tympani occurred. That a change in the condition of the Eustachian tube took place during the sore throat is rendered probable by the patient's statement that her voice then "sounded" or "rang" in her ears. This is a symptom of a permanently open state of the faucial orifice of the tube; and might have been due, in the present case, to a tension of the adjacent parts, or a spasm of the muscle which opens the tube.[1]

In this, as in the former case, pain felt within the ear indicated a participation of the lining of the tympanum in the inflammatory action.

The third case is that of the son of the last patient, and brother of the former.

Case 3.—S. R——, æt. 23; very tall, being six feet three inches in height; thin, of dark complexion, general good health; working hard as a student. Had scarlatina at seven years of age. This was not noticed to affect his hearing, but he had always seemed rather dull in that respect. For a year or two this dulness had increased, without apparent cause, and was now become practically inconvenient. There was an occasional humming or buzzing noise in the ears.

November 20th, 1863.—Watch heard—right four inches, left ten; heard also on any part of the skull. A plug of hard wax was syringed from the right ear, producing very little

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[1] The tensor palati. Whether the levator palati participates in this action has been questioned.

difference in the hearing of the watch. The inner part of each meatus was somewhat congested; membrana tympani normal; Eustachian tubes freely pervious. After the syringing he seemed for a time to hear somewhat better, but he soon became worse again while engaged in taking his degree.

April 15th, 1864.—He died quite unexpectedly on the fourth day of what appeared to be an attack of rheumatic fever, proceeding favorably. Nothing was found to account for the fatal issue ; neither the heart nor the brain was visibly diseased. The petrous bones were removed about sixty hours after death. The membrana tympani on each side was normal. The mucous membrane of the tympanum exhibited numerous congested vessels, giving it a markedly vascular appearance. This was probably connected with the fatal illness. It was not thick or soft. The articulation of the stapes to the vestibule presented certain peculiarities. On each side the anterior crus (opposite to the attachment of the stapedius muscle) was of an opaque white, quite unlike the rest of the bone, which presented the usual pale-grayish hue, and the base, when viewed on the vestibular aspect, was of a markedly white colour, contrasting much more than is usual with the rest of the vestibular wall. The stapedius muscle on each side was healthy in structure, as shown by the microscope. On the right side the stapes was less freely movable than on the left, and the action of the stapedius seemed to be different from that which is usual. By drawing on the muscle the stapes was, by a very slight amount of motion, pulled down into contact with the promontory, and there fixed; it was scarcely at all withdrawn from the vestibule. On the left side the normal rotatory action was produced.

The membrane of the fenestra rotunda, on the right side, was clear and bright, convex towards the tympanum. On the left side it was covered by a membranoid lamina, which adhered, but was not attached, to the surrounding tympanic wall. This lamina was thick and of dark-gray colour, showing under the microscope scarcely any trace of structure; probably it was a mass simply of inspissated mucus.

Under the microscope, the vestibule on the right side appeared normal, the otoconie rather scanty. On the left side, however, it presented in its whole extent numerous large oval

or circular outlines, apparently cellular structures, yet greatly exceeding in size the normal vestibular epithelium, being about the $\frac{1}{800}$ of an inch in diameter, and presenting no trace of nucleus or contents. In some parts they were isolated, in others lying in groups, sometimes appearing to run into one another, and exhibiting rather a lobulated outline than distinct forms.

The cochlea appeared healthy. The fibres of the auditory nerve on each side seemed softened and bulging, doubtless from post-mortem change.

On reviewing this case it appears most probable that the cause of the deafness on the right side lay, at least in part, in the condition of the stapes—its diminished mobility, and especially the abnormal action of the stapedius muscle. The slight "dulness of hearing" from childhood might probably be thus accounted for, the adaptation of the ear to the varying intonations of the human voice being impaired or never fully acquired. The stapedial motions were free on the left, the better, ear. In this the fenestra rotunda was occluded, and the vestibule showed a deviation from its usual structure. How far this latter condition is to be looked upon as morbid I cannot as yet speak with confidence. I have met with a similar appearance in several other cases, in all of which deafness of some standing had been present. It does not appear to be due (as might, perhaps, have been suspected) to incipient decomposition. A similar condition of the vestibule has been observed by Politzer, Voltolini, and Lucae.[1] The latter first met with it in a case of old perforation of the membrana tympani. In one instance he succeeded in obtaining from the large globular bodies above described some small striated particles, which gave a blue colour by iodine, turning brown on the addition of sulphuric acid, and which he therefore supposes to be corpora amylacea.

In respect to the family history of these cases, there is nothing to remark except that the mother's only sister heard with extreme acuteness, so much so that ordinary sounds were a source of distress to her. No other members of the family were deaf.

[1] Virchow's 'Archiv,' 1864, Heft 1 & 2.

CERTAIN ABNORMAL CONDITIONS OF THE BONES.

By ARTHUR E. DURHAM.

SOME diseases are especially interesting on account of their frequency and obvious practical importance, others seem rather to attract attention because they are so rare and (when met with) appear so curious. But it is manifestly desirable to become acquainted, as far as we can, with every form of disease that may possibly present itself, as well as with those forms which actually occur most frequently. Moreover, striking instances are not wanting in which cases and speci- mens, long regarded as mere pathological curiosities, have been found to possess important practical bearings when advancing knowledge has led to the recognition of their true significance. I need, therefore, offer no apology for devoting the following few pages to the discussion of some points in con- nection with those remarkable conditions of the bones which are called respectively (and not inappropriately) Mollities Ossium or Osteomalacia, and Osteoporosis, especially that form of the latter which, when affecting the head, has sometimes been designated Hyperostosis Cranii. Each of these condi- tions is very rare, at any rate in those advanced stages in which alone, in the present state of our knowledge, it can be recognised. Each (the latter especially) has been accidentally discovered after death in many instances in which its presence had never been suspected, much less accurately diagnosed, during life; and further, there is, I believe, a very intimate relation, in point of succession, between the two conditions to

the existence of which, as far as I have been able to ascertain, attention has hitherto been but very imperfectly, if at all, directed. Before entering upon the discussion of the general history of these diseases, however, I would venture to ask attention to the details of a few interesting cases hitherto unpublished.

<div align="center">MOLLITIES OSSIUM.</div>

I am indebted to Mr. Hilton for permission to publish the following case, and to his dresser, Mr. J. J. Phillips, for the particulars with which he has kindly furnished me. This case, I think, fairly illustrates the usual origin, progress, symptoms, and termination, of the most severe form of progressive softening and absorption of the bones.

CASE 1.—S. W—, a respectable married woman, æt. 45, was admitted into Charity Ward, Guy's Hospital, under the care of Mr. Hilton, on the 23rd of November, 1863. She had come of healthy parentage; her father had been dead only a year at the period of her admission, and her mother was still living. Of her thirteen brothers and sisters nine were alive and well, and of the four who had died none suffered from any hereditary or constitutional disease. She herself was always somewhat below the standard height, but up to the commencement of her present malady had enjoyed uniformly good health, although she had been subject from time to time to considerable privations. She had worked hard as a laundress, and consequently had been frequently for long hours in bad atmosphere; *otherwise,* she does not appear to have been exposed to cold and damp to any noteworthy extent. She had resided for many years in the immediate neighbourhood of Ludgate Hill. She had borne four children, all whom, at the time of her admission to the hospital, were alive and apparently healthy; the eldest being twelve years of age, the youngest about four. After the birth of the last-mentioned child she very soon became again pregnant, and about three years before admission she was delivered, after a very long, lingering labour, of a full-grown but stillborn child. When sufficiently recovered from her confinement to leave her bed she was suddenly seized with such severe pain in both heels that she was quite unable to put

either foot to the ground. The pain gradually extended up the legs; both lower extremities became œdematous, and the abdomen ascitic. By the end of seven weeks the pain was so far alleviated, and the swelling so far diminished, that she managed to walk about; but she remained in a low state of health, and the pain never entirely left her. In the course of two years the pain again became very severe; it was felt in both lower limbs throughout their whole extent, but seemed especially to cross, as it were, from one hip to the other.

In October, 1862, while attempting to dress herself, she fainted, and fell from the edge of the bed on which she was sitting to the ground. A medical man who was called in, stated that the right thigh-bone was broken, and advised her to go to some hospital. She accordingly obtained admission into St. Bartholomew's, where she remained five months. A long straight splint was applied to the outer side of the injured thigh and kept on for a month. No reparative action took place. About a month after her admission, while the bed-clothes were being changed by the nurse, the left femur gave way. She did not feel the bone crack; it seemed merely to bend, as if it were not strong enough to support the weight of the limb. During the remainder of her stay in the hospital the limbs were kept in as good position as practicable by means of pillows.

In March, 1863, she left St. Bartholomew's, hoping to be able to do a little needlework at home. She found herself, however, quite unable to do anything of the kind. She was confined absolutely to her bed, overpowered by severe pain and general weakness. Deep-seated aching pain soon attacked the upper extremities also, especially the left; and one bone after another gave way, in each instance bending rather than breaking. The left humerus followed the femora, then the bones of both legs, then the right humerus. The thighs could be moved into almost any shape or position, and much suffering was occasioned by their frequent accidental displacement. In this miserable state the poor woman remained, until, her house being required by the London Chatham and Dover Railway, she was brought by the officials to Guy's Hospital, packed in a box especially made for the purpose.

On admission (November, 1863) her condition was most

pitiable; she was much emaciated; almost every part of her body was more or less deformed, and her sufferings from pain, and excessive weakness were manifestly very acute. Her hair was of a dark-brown colour, as also were her irides. There was no arcus senilis. The head preserved its normal form, but the malar bones were very prominent. The superior maxillary bones were soft, yielding readily to pressure. The inferior maxilla was much firmer. The teeth were tolerably good, and did not appear to be at all softened. Mastication gave rise to considerable pain, and at best was only imperfectly accomplished. The chest was much deformed, especially on the left side, from softening and falling in of the ribs. Some idea of the deformity presented by the lower part of the body may be obtained from Plate I. The skin generally was more or less scaly, and on the legs especially was almost icthyotic in appearance. There was no manifest indication of any visceral disease. Her appetite was tolerably good; thirst always considerable, at times intense; pulse normal in frequency, but feeble; respiration not hurried. She did not complain of headache nor of pain in the back. The perspiration was free, always probably rather in excess, and at times very profuse; it did not possess any peculiar odour, nor was it noticed to stain the linen in any remarkable manner. The urine, when passed, was of a pale-straw colour, not quite clear, alkaline in reaction, but *not* ammoniacal, and of specific gravity 1015. On standing over-night a whitish sediment, composed chiefly of phosphate of lime was deposited, and an iridescent pellicle of triple phosphate appeared on the surface. An abundant white precipitate, soluble in nitric acid, insoluble in acetic acid, was thrown down on the addition of oxalate of ammonia. Nitric acid, when added, caused no precipitate, nor did it give rise, even after very long standing, to the remarkable reaction noticed by Dr. Bence Jones[*] in a somewhat similar case. The urine preserved about the same character throughout.

She was ordered to take half an ounce of lime-water in milk with a drachm of syrup of poppies three times a day; also two drachms of syrup of the phosphate of iron in water three times a day after her meals; six ounces of wine, and such

[1] ' Transactions of Royal Society,' 1848.

food as she could take. For some days she continued apparently in much the same state, her appetite being tolerably good. She complained of intense pain in the extremities (particularly the lower), brought on by the slightest motion, continuing for an hour or two, and then partially subsiding.

On 19th December she was ordered to take, instead of the before-mentioned medicines, a teaspoonful of bone powder in cod-liver oil thrice daily. It was found, however, that the lime salts were not assimilated to any extent, for during their administration the quantity of lime carried off in the urine was proportionately increased. The cod-liver oil, moreover, made her sick. These medicines were therefore discontinued.

About the latter end of December the greatest pain was in the left upper extremity, the bones of the whole of which were soft, and gradually becoming more and more bent.

On the 7th January, 1864, she was ordered to take fifteen minims of the tincture of the sesquichloride of iron in infusion of quassia three times daily; her wine was increased to eight ounces, and a little brandy was also given from time to time.

On the 14th January a considerable quantity of florid blood and some coagula were passed from the bowels; the hæmorrhage continued during the next day, and then ceased. Gallic acid and infusion of roses were freely administered. The general decline of the patient, which hitherto had been gradual, and marked by no special indications or symptoms, now became very rapid. She presented much the appearance of a patient in the last stage of hectic fever. Day after day she appeared manifestly weaker. Her respiration became more and more gasping, hurried, and difficult; and on the 19th January she died, apparently from simple inability to breathe longer, on account of the extremely soft and yielding condition of the ribs. The muscles of respiration at each effort seemed rather to bend the ribs than to expand the chest. During the latter days of her life her head was the only part which at all retained the natural form. The chest was much distorted, the spine somewhat curved. The extremities were all, with the exception of the right forearm, more or less bent and twisted.

At the post-mortem examination no disease of any of the

viscera was discovered. The brain appeared firm and healthy. The heart was natural, its muscular tissue not obviously degenerated. The lungs were sound, and less congested than might have been expected, considering the mode of death. The liver was not unusually fatty. The alimentary canal appeared healthy throughout. There was no ulcer nor internal pile in the rectum, but this portion of bowel was enormously distended by fæces. No further explanation was found of the hæmorrhage which had occurred shortly before death. The kidneys were apparently normal, except that one contained a small calculus in a pouch connected with its pelvis. The sub-cutaneous tissues were œdematous, and contained a quantity of altered fat.

All the bones examined had undergone, to a greater or less extent, those remarkable changes in appearance and texture which are characteristic of true mollities ossium. They could without exception, be cut by the knife, and for the most part with great ease.

The shafts of the long bones were affected to the greatest extent. When cut into by the knife they seemed to consist of a soft, red, greasy mass, breaking down easily under the fingers, not unlike liver in appearance, but more gelatinous in consistency, enclosed in a sheath of thickened and somewhat altered periosteum. The extremities of the bones, almost without exception, retained externally a shell of bony material, but internally presented the same appearances as the shafts.

The bodies of the vertebræ seemed eaten out, as it were, into large cavities, filled with a soft red substance similar to that in the long bones. The transverse processes and laminæ, as also the ribs, clavicles, and sternum, were similarly affected. All of these, though much hollowed out, retained some bony material. The pelvis was not notably distorted; its bones, however, had undergone considerable softening. The skull presented, when cut, a very peculiar appearance. It was considerably increased in thickness, red in colour, and so far homogeneous that no distinction was visible between the tables and diploe. In texture it somewhat resembled softened pasteboard. The basilar process was flattened out in such a manner as made it appear to have altered its relation to the foramen magnum. The sutures could scarcely be traced.

Several small portions of bone were kept, and are now in the museum. Representations of some of them, drawn to the natural dimensions, are given in Plate II.

These drawings necessarily convey but a very imperfect idea of the curiously abnormal appearance of the recent specimens. Still, however, the remarkable thinness of the remaining external shells (figs. 1, 4) of bone, the almost entire absence of true cancellated structure (figs. 1, 2, 4), the attenuation of the articular cartilages (figs. 1, 2, 4), the fusion, as it were, of the semilunar cartilages with the head of the tibia (fig. 1), and the partial fibrous anchylosis of one condyle of the femur to the corresponding tuberosity of the tibia (fig. 2), are tolerably well shown, as also are the " excavated " appearance of the bodies of the vertebræ (fig. 5), and the thickening and unnatural uniformity in substance of the calvarium (fig. 3). In the recent state the cavities, small and large, in all the bones, were filled with soft, or even semifluid, greasy material, varying in colour in different parts from yellow to dark red, and similar to that already described as replacing the shafts of the long bones.

I have very carefully examined, both chemically and microscopically, the several portions of bone which were preserved. The results of my examination, although, for the most, agreeing with those obtained by previous observers, seem in certain respects to suggest ideas as to the possible course (if not as to the essential nature) of mollities ossium, somewhat, perhaps, in advance of those hitherto maintained. These results, however, and the ideas suggested, can be more conveniently discussed at a future page.

I am indebted to Dr. Gull for the particulars of the following case:

Case 2.—Some few years ago Z——, the wife of a medical man, began to suffer with gradually increasing weakness and pain in the dorsal region, associated with more or less deformity, somewhat resembling that produced by ordinary anterolateral curvature of the spine. She consulted Sir B. Brodie, who told her she need be under no anxiety; the deformity had probably existed a very long time— most likely from girlhood— and would not get worse. She herself was satisfied that the

deformity was of recent origin ; and, after a time, finding her weakness increasing, and her deformity becoming more mani- fest, she went to Dr. Gull for further advice. At the period of her first visit she was about fifty-four years of age, rather under the middle stature, and apparently in feeble health. She had had a large family, and had ceased to menstruate a year or two. She had suffered much from various causes of mental anxiety, but not from privation, nor any unusual ex- posure to cold or damp. She complained of great general weakness, and inability to hold herself upright, or exert herself in any way. Her deformity was remarkable, but difficult to describe. The spinal column in the dorsal region seemed bowed backwards and to one side ; the ribs were flattened laterally and projected anteriorly. Her whole appearance conveyed the idea of a general softening and yielding of all the bones entering into the formation of the thoracic parietes. She did not complain of pains in her limbs, and the long bones were very little, if at all, affected. She suffered a great deal from headache. As the malady progressed her head seemed to sink down between her shoulders. There was no evidence of any visceral disease. The urine was not particularly examined ; at any rate, no peculiarities in it could be remembered. . From the period of her first visit to her death, which occurred in somewhat less than a year, she was seen from time to time by Dr. Gull, as well as by Sir B. Brodie, who was much struck by the difference between the actual progress of the case and that which he had at first anticipated. The thoracic deformity rapidly increased. The spine became more and more bowed ; the head sank lower and lower between the shoulders ; the ribs seemed to pass more and more one over the other ; and the sides of the chest became more and more flattened, until the appearance was pre- sented of a general collapse or squeezing in of the whole upper part of the body. At length the patient died, literally because she could breathe no longer. For a short time before death there had been some bronchitis, but not to such an extent as would have proved fatal under ordinary circumstances.

CASE 3.——In the year 1837 the body of a woman was brought from the workhouse to the dissecting-room of Guy's

Hospital, where it was discovered that she had been the sub-
ject of mollities ossium.   The pelvis,[1] femur,[2] tibia and fibula,[3]
are preserved in the museum, and afford good illustrations of
the disease under consideration.   The following particulars of
the case are quoted, or condensed, from the account given in
the ‘Museum Note-Book,’ No. 2, page 33 :

It was ascertained, on inquiry at the workhouse, where
she had lived for seven or eight years, that the patient,
having been a very active little woman, had been employed
for some time as helper in the house, and in the fulfil-
ment of her duties had been in the habit of “lifting and
carrying considerable weights.”   About four years before her
death “her strength began to fail, and from that time she com-
plained of constant pain in the lower extremities.”   At a sub-
sequent period she also complained of pain in the upper
extremities.   She became gradually weak, and by the end of
a year she was scarcely able to walk.   It was also noticed that
her back was beginning to be unnaturally bent.   In the course
of another year she had become quite helpless and confined to
her bed.   For several months her urine was observed to be
“very thick, like thin gruel or flour mixed with water,” to de-
posit a sediment, and to become “very offensive to the smell
soon after emission.”   During the last year, or year and a
half, of her life her spine appears to have become much curved.
She was noticed to be “always bent towards the right and for-
wards, with her legs slightly drawn upwards, the left leg in-
clining over the right.”   Sight, hearing, and voice, remained
good up to the time of her death.   There was nothing peculiar
about the “evacuations from the bowels.”

On examination in the dissecting-room it was found that
the exterior of the skull was less resisting than usual, and in-
ternally “the whole base, including (the superficial parts of)
the petrous portions of the temporal bones, was decidedly soft,
allowing an incision of nearly a line in depth to be made with
ease.   The bones of the internal ear, however, appeared quite
as hard as usual, nor did the interior of the petrous portions
seem to have been altered in density.”   In the dorsal region
the spine was extremely curved towards the right side, “a por-

[1] See Specimens 1124[90], (²) 1134[74, 75], (³) 1212[82], and Drawing No. 8,
‘Catalogue Pathological Collection, Guy’s Hospital Museum,’ vol. i, p. 8.

tion of it being compressed in the deep groove between the sides of the vertebræ and the internal aspects of the ribs."

" The pleuræ (on the right side) were adherent, and the lung consolidated by compression. No tubercles were observable in the lungs. The heart appeared healthy, excepting that its fibres were paler and softer than usual." The arteries were similar in condition to those of aged persons. The sciatic nerve was very much enlarged (on which side is not stated, nor whether on both ; no relation, therefore, can be made out between this peculiar condition of the nerve and the nutrition of the parts supplied).

Almost " any part of the skeleton could be cut with an ordinary scalpel, either transversely or vertically." The ribs could all be bent by very slight pressure, and very easily broken.

The humerus, also, was easily bent, and broken by the hands alone, " without any great effort."

The pelvis also was soft and bent by the weight of the body. It is accurately described in the 'Catalogue of the Museum' (p. 85) as " presenting the peculiarities produced by mollities ossium ; the acetabula have been thrust upwards, the spine downwards, and the pubes forwards ; the opening of the pelvis is thus much narrowed, and of a heart-shape, the pubes being rostrated."

On section the shafts of the long bones, which had undergone the most extensive softening, were found to consist of " thin diaphanous shells " of bony material, in some parts scarcely thicker than " common writing-paper," and hardly any were more than one-twentieth of an inch in thickness, except in the neighbourhood of certain fractures, to be presently described. The cancellated structure was " not bony and crisp, as usual, but soft and membranous."

The lower half of the left femur showed, perhaps, the least deviation from the normal state. The outer shell of bone was rather thinner and less dense than in health, but much denser and harder than that of any of the other bones of the same extremity. The interior was occupied by an opaque, thick, jelly-like substance, yellowish or brown in colour, and, at first sight, apparently homogeneous. By means of a probe, however, branching filaments, which appeared to consist of the endosteum and blood-vessels of the cancellated tissue, could be

raised out of the mass.   Minute scales of bones were noticed adhering to the membranous filaments.   The articular cartilages appeared healthy.

The left femur and the right tibia and fibula had been fractured during life.   No successful attempt at bony union was manifest.   There were no signs of active change in the surrounding soft parts.   There did not appear to be any increased vascularity about the fractured ends themselves.   The periosteum around them, however, was much thickened for the space of about two inches; and a new " deposit " of bony material had taken place upon the old shells, whereby their substance was increased to an average thickness of three lines for an inch or so from the point of fracture.   The new bony deposits, like the old shells, were soft and spongy.

The museum of Guy's Hospital contains several specimens illustrating mollities ossium besides those obtained from the subjects of the cases above related.   None of them, however, require any detailed description in the present paper, although they deserve a passing notice.   Two[1] were taken from the body of Sarah U——, whose case is fully recorded in Mr. Solly's well-known paper in the twenty-seventh volume of the 'Medico-Chirurgical Transactions.'   Two[2] others were taken from the body of a man who had been under the care of the late Mr. Bryant, of Kennington.   " When first seen, this man had the bones of his legs bent and broken; the clavicles were out of place, and had formed false joints; the humeri were very brittle and easily broken."[3]   No further particulars are given.

There is also in the museum the skeleton of a sweep[4] said to have been the subject of mollities; but there is no history, and the nature of the disease is doubtful.

To proceed now to the more general consideration of the causes, symptoms, and phenomena of mollities ossium, Litzmann—whose treatise on the subject,[5] with the exception,

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[1] Specimens No. 1004, 1004⁸⁹.   Presented by Mr. Solley.

[2] Specimens 1160⁶⁴, 1160⁶⁵.

[3] (Museum) Note Book, p. 48.

[4] Specimen 1000³⁰.

[5] ' Die Formen des Beckens, insbesondere des engen Weiblichen Beckens, nach eigenen Beobachtungen und Untersuchungen, nebst einem Anhange über die Osteo-

perhaps, of Beylard's, is, I believe, in many respects, the most complete yet published—has collected and analysed 131 cases. I have, as far as I have been able, referred to the original details of these cases, and, with a few somewhat doubtful exceptions, cannot do otherwise than accept them as genuine examples of the disease in question. In addition to the number quoted by Litzmann, I have been able to collect the particulars of 14 other cases, making a total of 145.

Of the 145 patients, 13 only were males and 132 females.

Of the females, 91 were first affected during pregnancy, or very shortly after childbirth.

The symptoms of the disease first appeared in 10 patients only, 7 females and 3 males, under 20 years of age, and in 12 patients over 50. The great majority began to suffer when between 25 and 35 years of age.

The bones of the pelvis are stated to have been affected in					133	cases.
,,	,,	spinal column	,,	,,	98	,,
,,	,,	thorax	,,	,,	71	,,
,,	,,	lower extremities	,,	,,	59	,,
,,	,,	upper extremities	,,	,,	47	,,
,,	,,	head	,,	,,	35	,, .

In 33 cases only are all the bones of the skeleton stated to have been affected.

In the vast majority of the 91 cases described as commencing more or less directly in connection with pregnancy, the first symptoms manifested themselves in or about the pelvis and lower part of the spine. In 73 of these cases the disease was absolutely confined to the bones of the trunk, and in a very great many cases there is no evidence of any other than the pelvic bones having been affected. How far such cases as these last are to be regarded as examples of true mollities may fairly be questioned. We may defer inquiry upon this point, however, to a more convenient period ; for the present, I would only say, once for all, the statistics given must be taken for what they are worth, not as absolutely reliable, for many of the cases are very imperfectly reported ; some being narrated only, or, at any rate, especially, in reference to obstetrical difficulties produced by the special

malacie,' Berlin, 1861. The " Appendix on Mollities Ossium," translated by Dr. Matthews Duncan, appears in the ' Edinburgh Medical Journal,' vol. vii.

deformities of the pelvis; and, in many, certain parts only of the skeleton appear to have been examined—those parts, that is to say, in which fractures or flexions indicated the existence of the disease.

In the majority of the cases not immediately connected with pregnancy or childbirth, and in some of the worst of those that were, the symptoms first, or at any rate very early, manifested themselves in the lower extremities.

As to the precise cause of this remarkable malady we know absolutely nothing. All the indications at present afforded us are negative rather than positive. Even as to the more general causes we are almost equally in the dark, so little agreement does there appear to exist between the earlier histories of different cases. Among the sufferers have been persons of originally the most different temperaments. A very large proportion are stated to have been of perfectly healthy parentage. Many, it is true, resided in unfavorable localities, but many others did not. Many had been subject to considerable privation, but others appear to have been well clothed and well fed. Some attributed the origin of their sufferings to their having slept in damp sheets,[1] or in cold humid situations,[2] or to their having worked in wet and exposed localities.[3] Many appear to have suffered from privation, damp, and cold, conjoined, as was notably the case with the numerous patients at Sottegem, in Flanders,[4] mentioned by Hoebecke, upon several of whom the Cæsarean section was performed; but many others suffered from none of these influences, much less from all conjoined. Some few (six only) were known to have had syphilis; but no evidence of any such taint appears to have been obtained in the very large remainder of the recorded cases.

Tuberculous disease is noted as having been very rarely met with; so rarely, indeed, that Beylard expresses his opinion that "an antagonism seems to exist between tubercle and mollities ossium.[5] Important visceral disease has been dis-

[1] Howship, 'Trans. Med. Chir. Soc. Edinburgh,' vol. ii.

[2] Gosselin, quoted by Beylard, op. cit.

[3] Stanski, 'Recherches sur les Maladies des Os,' Paris, 1852.

[4] Hoebecke, 'Mém. et Obs. pratiques de Chir. et Obstet.,' Bruxelles, 1840.

[5] Beylard, op. cit., p. 33.

covered on post-mortem examination in but few instances, and detected during life in fewer still. In no instance was the disease found of such a nature as to offer the slightest explanation of the morbid conditions of the bones, or of the peculiar symptoms therewith associated, beyond that afforded by the bones themselves.

In eight instances the patients were insane. In all, with the single exception of the first case recorded by Mr. Solly,[1] the bones became affected *after* the symptoms of insanity were fully established. But in the remaining 137 cases the mental faculties do not appear to have been impaired, not even in those of the cases in which the cranial bones were extensively softened. In a very great many instances, however, the patients had suffered long and severely from lowness of spirits, anxiety, fear, or grief.

One indication as to the direction in which the general, if not the particular, cause of the disease is to be sought, and one only, as far as I have been able to make out, is given in common by each and every one of the fully reported cases. In the histories of all, without exception, mention is made of the existence of some influence or other, or of some combination of influences, well known to be capable of producing great general depression of the nervous system. In many instances, moreover, such influences appear to have been in operation with or without intermission for long periods. Severe privation, and anxiety associated with precarious means of existence—long continued exposure to cold and wet—pregnancies too frequently repeated, with miscarriages or difficult labours—mental distress, profound melancholy—and all the other circumstances above alluded to—however much they differ in other respects, agree at least in this, that they, one and all, have a tendency to depress, exhaust, and even to paralyse for a time, the powers of the nervous system, and consequently to injuriously modify, to a greater or less extent, those nutritive processes upon which the maintenance of the whole body depends. It certainly appears difficult to understand why the bones should be, or seem to be, especially affected by any such general cause, and undergo more manifestly than other parts destructive changes, without compensatory reparation. But it

[1] In ' Med.-Chir. Trans.,' vol. ix, p. 438.

must be borne in mind that bone is among the least highly vitalized of the tissues, and certainly the least highly vitalized of all in connection with which a comparatively abundant vascular supply is ready to promote absorption, and in other ways to assist destruction as well as repair. Nay, further, the very formation of bone is, not without reason, regarded by some as a downward step, and ossification as an expression, or at any rate as a manifestation, of degeneration. Now, if this view be correct, it is not difficult to conceive that, under certain morbid conditions of the general system, destructive changes would become more rapidly, and notably manifest in those tissues in which degenerative processes had already commenced, or become established. In connection with this point it is worthy of note also, that under altogether different circumstances, as for example, from the influence of continued pressure, we find bones degenerating and becoming absorbed more quickly and manifestly than the softer parts, which are composed of more highly vitalized tissues.

On the whole, it seems probable that mollities ossium is to be regarded as a particular expression, as it were, of a general morbid condition of the system, rather than as a special disease of the bones themselves. But in the present state of our knowledge we cannot accurately describe and define any such general morbid condition, much less explain why it should give rise to the remarkable phenomena and symptoms associated with it.

A great many different hypothetical explanations of the special pathology of mollities have been suggested by different authors. All, however, that I have hitherto met with are, to my mind, unsatisfactory in the extreme. For I find, without exception, that the hypothesis which fulfils tolerably well the requirements of some cases cannot possibly be made to accord with the phenomena of others, even if it be not absolutely negatived by them.

Morand,[1] I believe, was the first who supposed an "acid diathesis" to be the starting-point of the malady. Several subsequent writers have repeated this hypothesis, slightly modifying it in various ways. Phosphoric and lactic acids

[1] See Beylard, op. cit., p. 227. ' Histoire de l'Acad. Roy. des Sciences,' 1753, pp. 114 and 541.

have each in turn been fixed upon as the immediate agents in
the bone-softening process. C. Schmidt[1] found excess of
phosphoric acid and lactic acid in combination with lime in
the fluid contained in the interior of the bones of a patient
who suffered from mollities. The fluid had an acid reaction.
The patient, a young woman, was taken ill about the period
of her confinement, " evidently in consequence of deep grief."
Schmidt suggests the idea that the sugar of milk in the system
may by some chemical change have given rise to the produc-
tion of the lactic acid which was found. He does not, however,
clearly make out whether the presence of lactic acid was the
cause or the consequence of the altered condition of the bones.
The probability, I think, is that the latter was the case ; for
lactic acid does not appear to have been discovered in the
blood, nor in any other parts of the body than the diseased
bones ; and it does not seem improbable (as suggested) that
the lactic-acid fermentation may have been set up in the sugar
of milk contained in the blood, by contact with the changing
morbid materials of the affected bones. C. O. Weber[2] sup-
ports the same view, and further suggests that the lactic acid
serves to convert the comparatively insoluble *tribasic* phosphate
of lime of normal bone into the comparatively soluble *bibasic*
phosphate. Unfortunately, this hypothesis is inconsistent to
an extent altogether inexplicable with the facts of many care-
fully observed cases ; and even if it were not, it is obvious
that the presence of lactic or any other acid must be regarded
as a phenomenon, not as a cause—a something itself to be ex-
plained rather than an explanation—of the essential nature of
the malady under discussion. Regarded simply as one of the
phenomena of mollities ossium, the presence of lactic acid is
important and interesting. It is, however, as already intimated,
by no means a constant phenomenon, and has often been ex-
pressly sought and not found. For example, Professor H.
Frey[3] was unable to detect any trace of lactic acid in the bones
of a subject he very carefully examined. Virchow,[4] in a case

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[1] " Knochenerweichung durch Milchsaürebildung ;" Wöhler und Liebig, ' Annalen
de Chemie u. Pharmac.,' Bd. lxi, pp. 329—335. Quoted by Litzmann, op. cit.

[2] 'Ossium Mutationes Osteomalacia Universali effectæ,' C. O. Weber, Bonn,
1851.

[3] 'Mon. f. Geburtsk.,' Nov., 1862. Quoted in ' Med.-Chir. Review,' April, 1863.

[4] Quoted by Litzmann, op. cit.

which came under his observation, so far from discovering any acid, found that the contents of the diseased bones possessed a strong alkaline reaction.   Lehmann,[1] however, distinctly states that he has known cases "in which some of the bones of a patient affected with osteomalacia exhibited an acid reaction (as the femur and tibia), whilst others (as the ribs and pelvic-bones) showed no trace of the presence of acid." If more extended investigations should confirm this statement of Lehmann, and show that at one particular period in their process of change the bones contain acid, and at other periods do not, the inconsistency which at present exists between the results obtained by different observers would be explained ; and some further light might be thrown on this obscure subject. This would be especially the case if it should be found that in association with such changes in chemical reaction, the bones present other equally well-characterised and constant changes in their physical condition and chemical composition.

Another very different hypothetical explanation has been suggested, to the effect that, there being in pregnant women a large "demand for calcareous salt for the osseous system of the fœtus," the bones of the mother must be proportionately ill-nourished.   In support of this hypothesis the observations of Leuchs[2] are quoted.   He states that "hens having a de-ficiency of lime-containing nourishment either lay eggs without chalky shells, or they produce them at the expense of their own proper osseous system ; their bones become soft, the animals can no longer stand, get bent together, and die." These observations are most unquestionably very interesting; but it is difficult to understand how the hypothesis founded upon them can be made to apply to cases of mollities ossium occurring in men, or in women, who have never been pregnant ! ! !

M. Stanski[3] attributes the origin of mollities ossium to a vitiated condition of the blood.

Proesch[4] considers an alteration of the periosteum and en-dosteum to be the primary cause of the disease.

1 'Physiological Chemistry,' translated by Day, vol. iii, p. 29.

2 'Journal f. Pract. Chemie,' Bd. xxv, Heft 1, referred to by Litzmann, op. cit., Trans. 'Edinburgh Medical Journal,' vol. vii, p. 552.

3 'Recherches sur les Maladies des Os désignées sous le nom d'Ostéomalacie,' Paris, 1851.

4 'Archives Générales de Méd.,' 1835.

Lobstein[1] suggests that the phenomena depend upon an increased activity of the absorbent vessels, due, probably, to a more energetic innervation.

Mr. Curling[2] speaks of mollities ossium as a form of " eccentric atrophy of the bones," " the result of defective nutrition, and not of increased activity in absorption."

Mr. Solly[3], on the other hand, considers that this is " an active disease, not a mere atrophy." He says further, " I am led to believe that it is of an inflammatory character. That it commences with a morbid action of the blood-vessels, which gives rise to that severe pain in the limbs invariably attendant on this disease, but more especially in its commencement, and exhibits itself after death by an arterial redness of the part. The absorbent vessels are at the same time unnaturally excited, and the earthy matter of the bone is absorbed and thrown out by the kidneys."

It would be very easy to add many others to the number of different opinions already quoted. But it is needless to do so. Where there is room for such difference of opinion, it is obvious that very little is known. It is equally obvious that, before any satisfactory explanation can be given of the causes and nature of the malady we are discussing, further investigation is absolutely necessary. In the present state of our knowledge on the subject it is useless attempting any new hypothesis.

But however difficult, or even impossible, it may be to ascertain the precise cause or causes of mollities ossium, and to arrive at any sound conclusion as to its essential nature, there is comparatively little difficulty in recognising the existence of this disease, at least in its more advanced stages, during life, and in tracing to a certain extent, after death, the progressive changes that may have taken place in the bones.

In the earlier stages the symptoms, though tolerably constant, are somewhat obscure, and perhaps not absolutely distinctive ; but when the malady has made any considerable progress they become well marked and unmistakable.

The first symptom of mollities, as shown by the history of almost every case, is pain, more or less peculiar in character, always deep-seated, and greatly increased by pressure or motion ;

[1] ' Traité d'Anatomie Pathologique,' t. ii, quoted by Beylard, op. cit.
[2] ' Med.-Chir. Trans.,' 1837, vol. xx.   [3] Ibid., 1844, vol. xxvii.

sometimes coming on suddenly and with extreme severity, sometimes commencing vaguely and insidiously, and gradually becoming almost insupportable ; sometimes wandering, at other times fixed for a period to some particular spot, and subsequently spreading to other parts ; sometimes intermitting, at other times unceasing. In some cases the pain is described as having been " dull " and " aching " in character, in others " burning," " piercing," or " tearing." In the majority of cases the pain appears to have been first felt in the lower half of the spine, the pelvis, and loins ; but in some it commenced in the feet, knees, or other parts of the lower extremities. It is curious to note how, in the records of case after case, the patient is said to have suffered from " rheumatic pains " for a considerable time, or to have been suddenly seized with " rheumatism." Still more curious is it to observe how, apparently in consequence of such expressions, certain authors have been led to consider mollities ossium of " rheumatic origin." Without at all doubting the existence of a malady properly called rheumatism, one cannot help being struck by the frequency with which " rheumatism " and " rheumatic pain" are employed as mere terms, and simply mean pain, the cause or origin of which has not been made out.

Associated with the pain there has always been noticed on the part of the patient, at a very early period of the malady, a feeling of general lassitude and disinclination to do anything. This feeling has increased more or less uniformly until it has ended in actual inability to make any exertion whatever.

The next set of symptoms to appear have, as a rule, been those more or less directly associated with the softening and absorption of the bones. Thus, diminution of stature, some deformity or other of the spine or pelvis, or some fracture or curvature of one or other of the long bones, has been noticed to occur, in different order of priority in different instances. Such indications of the nature of the case have, as a rule, gone on multiplying in number and increasing in extent from time to time during the remaining lifetime of the patient. Associated with the earlier periods of softening of the bones, (and probably arising from a reflex influence exerted through the nerves upon the muscles), has constantly been noticed another remarkable symptom, viz., an uncertain, feeble gait, and continual fear of

falling.   General feverish symptoms do not appear to have been frequently met with during the earlier stages of the malady, but have invariably supervened towards its termina-nation.   In no case, however, could the patient be said to have suffered from acute inflammatory fever, the symptoms being always of a low, and occasionally of an intermitting, type.

In almost all the carefully reported cases it is noted that the urine contained a quantity of lime salts very considerably in excess of the normal standard, or, at any rate, some indica-tion is afforded that such was the case.

In its earlier stages mollities ossium is liable to be mistaken for " rheumatism," diseases of the spinal cord, or certain of the more common affections of the vertebral column ; and the more so inasmuch as all often appear to arise from similar general conditions.   It is necessary, therefore, in dealing with obscure cases, to bear in mind the possibility of the existence of this disease, however rarely it may actually occur.   Perhaps if it were more frequently thought of, it might be more frequently discovered.

The pain of mollities ossium is more deeply seated, more evidently in the bones, than that of " muscular rheuma-tism ;" and when it occurs in the neighbourhood of joints, it is not associated with the swelling, heat, and redness, which more or less constantly characterise " articular rheumatism." It is, moreover, more persistent, and less readily yields to treatment, and it is accompanied by a feeling of weakness, and that fear of falling already referred to, which are seldom, if ever, met with in rheumatism.

The general symptoms of mollities, the seat and character of the pain, the peculiar gait and carriage of the body in walking, the absence of any loss of sensation in the lower extremities, the absence also of any difficulty in passing the urine or voiding the motions, serve to distinguish this malady from those affections of the spinal cord, giving rise to certain other symptoms which might render diagnosis difficult.   It is important, however, to bear in mind the possibility of the spinal cord being pressed upon, or otherwise interfered with, during the softening and sinking together of the vertebræ, and of there thus arising a combination of the symptoms of mollities ossium and damaged spinal cord.

The general symptoms, again, and the character of the deformities which arise, serve, if attentively considered, to distinguish mollities ossium affecting the vertebral column from any of the ordinary forms of spinal disease. But that a mistake may be made, even by the most experienced, is shown by the second case I have recorded above. The deformities of the spine produced by mollities have almost invariably been found to be exaggerations of the normal curves, or, at any rate, to be much more general than those abnormal curvatures more frequently met with. In no case has anything like *angular curvature* been found, nor have abscesses in connection with the diseased vertebræ ever been discovered.

It is scarcely possible that any difficulty can arise in distinguishing true mollities ossium from that softening and fragility which occur in connection with cancerous growths or deposits in the bones.

I would only further remark, in connection with this part of our subject, that mollities ossium ought never to have been confounded, as it has been, and still appears to be, in the minds of some, with rickets on the one hand, and senile fragility of the bones on the other. In rickets the primary cartilages have never become properly ossified. In senile fragilitas ossium the animal matter of the bones appears to be absorbed as rapidly, if not more rapidly, than the earthy constituents, and none of the characteristic general symptoms of true mollities are present.

Mr. Solly,[1] in his valuable paper already referred to, has rightly insisted on these distinctions. I would, however, suggest that the specific name he has proposed for the disease under consideration would be more fully descriptive and accurate if it were written " mollities ossium rubra, *flexilis*, et fragilis," instead of simply " rubra et fragilis." Flexibility conjoined with fragility, rather than simple fragility, appears to be the distinguishing character of the bones in this disease.

A minute examination, whether microscopical or chemical, reveals peculiarities in the intimate structure and composition of the affected bones as striking, and as characteristic of mollities ossium, as are the more general and obvious phenomena and symptoms already described. The differences which

[1] Op. cit.

exist between the results obtained, and published by various careful observers, appear to me for the most part either to be simply differences of interpretation, or else to have arisen from the fact that different bones, or bones in different stages of the disease, have in the several cases been selected for examination.

In the following résumé of the results of my own microscopical examination of various portions of bone taken from the subject of the first case recorded above, I have ventured to arrange the appearances observed in, what appears to me, their natural order of succession. Further investigation, however, may perhaps render the correctness of this arrangement doubtful ; for though I have carefully examined, I may say, some hundreds of specimens, I am still far from having succeeded in making out satisfactorily all the various shades of change through which the bony tissue must pass in its downward progress from the hardness and solidity of health to the dissolution and absorption of disease.

The different stages described were exhibited by specimens taken from different bones, or from different parts of the same bone. All sections were cut with a sharp knife ; none were ground, or subjected to any such rough, destructive treatment.

The portions of bone at my command have not afforded opportunity for proper investigation of the changes in the vascular supply which may well be supposed to precede or to accompany the changes in the bone-tissue itself; but, from what I have been able to make out, I am led to the belief that an increased quantity of blood is present in the bones, at any rate during the earlier stages of the disease ; but whether as a cause or consequence there is no evidence to show. In the later stages of the disease the minute vessels in the affected bones appear to become more or less highly congested and dilated ; in still later stages to degenerate, and in some instances to rupture. Shreds of what appear to have been blood-vessels, free blood-corpuscles more or less natural in appearance, others variously altered or broken up, and blood-colouring matter staining the general débris, are to be found readily enough, and to a very considerable extent, in the interior of most of the cavities in the diseased bones. The increased size of the larger blood-vessels which supply the

affected bones is, to a certain extent, rendered evident by the dilatation of the grooves, canals, and foramina, through which they pass. This dilatation of grooves, &c., is strikingly exhibited by those for the meningeal arteries in the interior of the calvarium I have been especially examining.

The first indication I have seen in the bone structure itself of the commencement of the disease is that, I believe, which is afforded by a peculiar alteration in the general appearance of the "bony-matter." This alteration may constantly be observed in sections taken from the least affected bones. It is comparatively easily appreciable, particularly when the sections are examined by polarized light, and compared with similarly prepared specimens of normal bone. The "bony matter" is seen to be more opaque and less uniform in appearance than natural; sometimes, even, it is irregularly granular. The semi-translucency and apparent homogeneity of material presented by healthy bone are lost to a greater or less extent. And the idea is suggested that some disunion, as it were, must have taken place between the component elements of the "bony-matter."

Next, the lamination of the affected bones becomes less distinct, and the semi-opacity and irregularly granulated appearance of the bony matter become more pronounced. The laminæ, especially the innermost ones, of the more perfect Haversian systems, appear to get more or less fused together; the lacunæ (or bone-corpuscles) become wider; some of the canaliculi increase, others diminish in calibre. I have not been able to find evidence of any new formation of bone-corpuscles, nor am I satisfied of the truth of the frequently repeated statement, that in bones affected with mollities the bone-corpuscles are " more numerous than usual." On the other hand, I have little doubt that Mr. Dalrymple[1] is correct in his opinion that, although " at first sight the bone-cells appear more numerous than is natural," this is " due to the approximation of the cells to each other, by reason of their mutual enlargement," and he might, I think, have added, to the absorption of intervening material.

Next, the earthy matter becomes entirely separated from the animal matter of the innermost laminæ, and more or less com-

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[1] 'Dublin Quarterly Journal,' vol. ii, p. 91.

pletely absorbed. Consequently the Haversian canals are seen to be surrounded by a comparatively clear and transparent ring of animal matter, from which the normal earthy constituents have been separated and carried off.

Next, the rings of animal matter are disintegrated and absorbed. Meantime the earlier changes described are going on in the surrounding laminæ. Their bony material loses its normal appearance; their lacunæ or corpuscles enlarge to a greater and greater extent; their canaliculi also enlarge and shorten, or become apparently obliterated; and, finally, the disintegration and absorption of their earthly and animal matters is in turn accomplished.

The same process is continued until the regular Haversian systems are all more or less completely destroyed; and, as a general effect, the bone assumes a hallowed-out, porous, or somewhat sponge-like appearance. Pores more or less circular in outline, or minute irregular spaces formed by the conjunction of two or more pores, represent in position, the previously existing Haversian systems. These pores and spaces are separated from one another by the few concentric laminæ that remain, and by those irregular laminæ which may be seen in almost every bone to fill up, as it were, in the normal condition, the intestices between the more perfect Haversian systems. A good idea of the appearance presented by a portion of bone in this condition, when seen by a low power (two-thirds-inch object-glass by Smith and Beck) is conveyed by Plate IV, fig. 2. A portion of normal bone from precisely the corresponding part of a healthy skull, and magnified to exactly the same extent, is represented, for the sake of comparison, in fig. 1. The contrast between the two is striking. In fig. 2 it is easy to recognise the enlarged and enlarging Haversian canals surrounded by comparatively transparent laminæ of animal matter, and to trace out the manner in which the larger spaces were probably filled up, in the healthy condition, by two or more Haversian systems that have already disappeared. In one or two spots the irregular laminæ alone remain. In no part of the specimen is the lamination anything like so obvious as in normal bone; nay, indeed, its vestiges can be traced only with great difficulty, or not at all. Fig. 3 represents a small portion of another specimen much more highly magnified. In this

figure the peculiar alterations in shape, size, and general appearance, exhibited by the lacunæ (or bone-corpuscles), and the enlargement of some canaliculi, and the disappearance of others, are very beautifully shown.   Some idea also is conveyed of the irregular and very delicate fibrillated appearance which the animal matter, deprived of its normal earthy associates, in some places presents when examined by a high power.   The lacunæ, as a rule, appear empty.   In some, however, I have seen distinctly enough the so-called nuclei.

Lastly, the irregular laminæ (or portions of bone which fill up the spaces between the regular Haversian systems) in their turn undergo similar processes of destructive change, until nothing is left of the original bony fabric but a delicate network of fibres and shreds of membrane, here and there dotted by minute fragments of undestroyed bone or adherent particles of amorphous earthy matter.

The processes of change which take place in the cancelled tissue are similar in character to those which have thus been more particularly described as witnessed in the compact tissue of the bones.   If the cancelli be thought of as very large Haversian canals or spaces, and the trabeculæ as flattened-out instead of concentric laminæ, the application of the description is manifest.   I think, however, that the various stages, at any rate the earlier ones, can be best made out in the compact tissue.   Destruction has generally advanced too far in the medullary portions of the bones before opportunities of examination are obtained.   In all cases, as already indicated, the effects of the disease are earliest manifested in the cancelled structure, and gradually extend thence from within outwards. The endosteum-lined portions of the bones are the first, the periosteum-covered portions the last, to suffer.

The changes in the compact tissue can be best investigated by means of thin sections cut with a sharp knife; those in the cancelled tissue by means of small portions of the trabeculæ carefully picked out, and very gently washed free of the adhering fat, &c.

Now the process of disintegration appears to go on much faster than that of absorption; for a large quantity of débris, organic and inorganic, is always to be found helping to fill up the spaces which would otherwise be left vacant by the de-

struction of the osseous tissue. Mixed with this débris are
the contents, more or less altered, of blood-vessels which, having
been previously distended, have finally ruptured, partly, per-
haps, in consequence of the destruction of their natural firm
support. The earthy débris is for the most part represented
by very minute molecules, more or less irregularly aggregated
together; the animal débris by shreds of membrane, ill-defined
fibres, cell-like bodies, and fat, either free, as oil-globules, or
contained in ill-developed or degenerated fat-cells. The precise
way in which fat is formed during the chemical disintegration
of the gelatigenous constituents of bone we do not know; but
we do know that fat is one of the commonest products of the
taking-to-pieces, as it were, of the various higher organic con-
stituents of the body. Where degeneration outruns absorption,
excess of fat is almost always to be found.

Mixed also with the débris are to be found many proper
" marrow-cells," some of them more or less altered in
character.

Thus, and of such constituents for the most part, if not
entirely, is made up, I believe, the peculiar greasy, yellow, red,
or brown material which occupies the place of the destroyed
bones, and fills the cavities of those which are still in the
earlier periods of the disease. Cells with or without nuclei
and nucleoli, and cells with or without tails—or what might
be described as such—are, doubtless, occasionally to be found
in greater or less abundance; but there is nothing distinctive
about them, as far as I am able to judge. The vast majority
of cell-like bodies I have met with in the cavities of the
diseased bones have seemed to me to have been formed by the
coalescence of the histolytic molecules rather than by any
proper process of cell development. This remark especially
applies to what have been described as " laminated amyloid" cor-
puscles.

The bones from a case of mollities ossium, however far the
disease may have progressed, yield no evidence of anything
like " malignant cell growth."[1]

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[1] I cannot leave this part of my subject without referring the reader for further
information to the details of the careful examinations made by Messrs. Birkett,
Rainey, and Simon, appended to Mr. Solly's paper (already quoted), as well as to
Mr. Dalrymple's contribution to the 'Dublin Journal,' vol. ii, on "The Micro-
scopical Characters of Mollities Ossium."

To proceed now to the results obtained by the chemical examination of the bones affected by mollities.

A great many analyses, qualitative and quantitative, of bones affected with mollities ossium, have been made from time to time. The particular results published do not precisely agree in any two cases, and in some instances differences are shown, which at first sight appear very striking. All the several records of analyses, however, which I have been able to collect, agree in indicating certain general conclusions as to some of the chemical phenomena of mollities. The differences shown are evidently due, for the most part, to the fact that the specimens selected for examination were, in the several cases, in different stages of the disease. Indeed, the analysis in each case may be considered as illustrating the extent to which the particular bone had become affected, rather than as proving the chemical composition proper to bones in general in mollities ossium. Each step in the downward progress must necessarily be associated with concomitant degrees of change, which may be rendered more or less evident by chemical as well as by physical examination. Further, other discrepancies in the results obtained doubtless depend upon differences in the methods of analysis adapted by different experimentalists.

The following are the results of two analyses of different parts of the calvarium from the subject of the first case recorded in the present paper. For purposes of comparison the results of the analysis of healthy bone are placed in the third column.

	Occipital bones (mollities ossium).	Frontal and portions of squamous bone (mollities ossium).	Occipital bone, normal (Von Bibra[1]).
Phosphate of lime . . .	41·53	39·19	57·66
Carbonate of lime . . .	?	evidently present	8·75
Carbonate and phosphate of magnesia	2·92	5·80	1·69
Chloride of sodium, &c. . .	—	—	·63
Phosphate of iron . . .	·70	·21	—
Insoluble matter	·40	—	—
	45·55	45·20	68·73
Organic matter, cartilage, fat, &c.	54·45	54·80	31·27
Total	100·00	100·00	100·00

[1] Von Bibra, 'Chemische Untersuchungen über die Knochen und Zähne des Menschen und der Wirbelthiere.'

The differences between the various published analyses of bones affected with mollities having being alluded to, and the probable explanation of such differences suggested, it seems to me needless to quote the particular figures of the analyses themselves. Suffice it to say, that the most complete, and at the same time, most reliable I have been able to find are those given by Dr. Rees[1] (who, in 1839, analysed the bones of the subject of the third case in the present paper), Bostock,[2] Proesch,[3] Boguer,[4] Lehmann,[5] and C. O. Weber[6] and Von Bibra.

The general conclusions indicated by the various analyses referred to, and further supported by my own, are as follows.

First. The relative proportion of inorganic to organic constituents is much less in bones affected with mollities ossium than in normal bones. The degree of diminution varies with the extent to which the disease may have progressed in the particular bone examined.

Secondly. The relation which the organic and inorganic constituents bear to one another is more or less changed. In normal bone there is reason to believe that a perfect chemical union exists between the mineral and animal elements. But in bone affected by mollities it appears to me that a special process of chemical disunion, as it were, must take place concomitantly with the physical disunion of which I have already spoken. At any rate, I have found that the earthy matter is much more readily dissolved out of such bone than out of normal bone. Sometimes even a certain quantity can be washed out by water alone, without the aid of acid. In healthy bone the constituents are combined. In bone affected by mollities they seem rather to be mixed.

Thirdly. Both animal and mineral constituents are severally changed to a greater or less extent in character and composition, as well in relative proportion and mode of association. The animal constituents consist of more fat and less

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[1] 'Guy's Hospital Reports,' 1839, vol. iv, p. 191.
[2] 'Med.-Chir. Trans.,' vol. iv, p. 38.
[3] " De Osteomalacia," 1835 ; 'Archives Générales de Médecine.'
[4] Valentin, 'Repertorium,' 1842, p. 394.
[5] Schmidt's 'Jahrb. der ges. Med.,' Bd. xxxviii, S. 280.
[6] Op. cit.

nitrogenized matter than is found in normal bone. The fat is more liquid, free to a greater extent, less confined by cell-membrane, and contains, probably, no phosphorus.[1] The nitrogenized matter is so far altered in character that in the earlier stages comparatively little gelantin or chordin is to be obtained by the ordinary processes, and in the later stages none at all. The solutions obtained from portions of the calvarium I have especially examined did not gelatinize to the slightest degree on cooling, and gave no precipitate with either the mineral acids, alcohol, or the prussiates of potash, although an abundant precipitate was thrown down by tincture of galls. The mineral constituents vary very much in the nature and relative proportion of the substances of which they are made up. In normal bone the carbonate and phosphate of lime are found to preserve a tolerably constant relative proportion. This is far from being the case in bones affected by mollities. In such the normal proportion of carbonate to phosphate is, as a rule, much diminished. There are, however, some exceptions recorded; for instance, in the analysis given by Proesch[1] of a dorsal vertebra, the proportion of carbonate to phosphate is increased to a remarkable extent. The figures given are—phosphate of lime, 13·25; carbonate of lime, 5·95; salts, ·90; cartilage, 74·64; fat, 5·26. No explanation is offered of this extraordinary proportion of carbonate. Besides such differences in the relative proportions of carbonate and phosphate of lime, there appears reason to believe that a particular difference in composition exists between the phosphate of lime, of normal bone and that of bone affected by mollities.[2] Thus much, and little or nothing more, has hitherto been determined respecting mollities ossium, as regarded from a purely chemical point of view. Very many points remain to be investigated, and certain of the results already obtained require further confirmation, or such criticism and explanation as further investigation alone can give. But, after all, when we consider the extreme complexity, heterogeneity, and ever varying character of the structures submitted to analysis, how coarse and clumsy appear even the most delicate and refined processes yet devised! And, again, when we con-

[1] Lehmann, vol. iii, p. 29.   [2] Op. cit.

[3] See C. O. Weber, op. cit.

sider that each tiny particle of any bone we are examining
may be in a different condition to that of almost every other
particle, and possess a correspondingly different composition,
how utterly unsatisfactory and apparently worthless do those
figures seem to become which represent only the bare quanti-
ties of earthy salts and animal matter contained in ten or
twenty grains' weight taken from the bone and pounded up
together. At best, such figures can represent only an average,
and that an unfair one, of the composition of a great number of
particles of bone in different conditions and differently con-
stituted. By way of illustration I may refer to the sketch
(Plate XI, fig. 3) of the section of a small portion of the
calvarium already so often referred to in the present paper.
At the spot indicated by letter *b* the bone, or what remains of
it, is so soft as to yield to the very slightest pressure, even of
the finger. By letter *a* is indicated a roundish, tolerably
well-defined spot, about one fifth of an inch in diameter, where
the bone is so hard as to be cut with a sharp knife only with
considerable difficulty. Now, portions of bone taken from the
spot *b* and submitted to the most careful chemical examination
under the microscope show no evidence of the presence of car-
bonate in their composition, while portions taken from the
spot *a* and similarly treated yield abundant bubbles of carbonic
acid. Further, at *b* the proportion of mineral constituents,
taken altogether, is manifestly extremely small, while at *a* the
proportion cannot be much, if any, less than that met with in
normal bone. Scattered throughout the bone I have examined
are many such spots of extreme variation, and often in close
proximity to one another. Similar notable variations might,
doubtless, be discovered, if looked for, in the substance of the
bones obtained from other cases. And if so, we may fairly
ask, what importance can be attached to any row of figures
which must necessarily include in one statement the respective
analyses of an uncertain number of certainly very different por-
tions of bone all added together?

We may now turn to the consideration of certain other and
more practical points in connection with our subject.

The prognosis in advanced cases of mollities ossium must,
unfortunately, and in the present state of our therapeutical
knowledge inevitably, be almost always fatal. In the earlier

stages, however, there is reason to believe some good can be effected.

Obvious improvement or cure is stated to have occurred in 22 cases out of the 145 already quoted. And in several instances which ultimately proved fatal (as, for instance, in Mr. Howship's well-known case[1]) the progress of the malady appears to have been temporarily arrested.

In 18 out of the above-mentioned 22 cases, however, the origin of the disease is clearly stated to have been more or less immediately associated with pregnancy or the puerperal condition ; and the pelvic bones alone, or the pelvic bones and the lower part only of the spine, were affected.

The issues of several cases on record are not given.

In 108 cases a fatal termination is reported. And in almost every instance the cause of death was clearly connected, directly or indirectly, with the softened or deformed condition of some or other of the bones.

In several cases (as, for example, in the two first reported in the present paper) the immediate cause of death appears to have been asphyxia, arising from the circumstance of the muscles of respiration bending the ribs, &c., instead of dilating the chest. In other instances, after having suffered from " slow fever," sometimes accompanied by diarrhœa, sometimes by obstinate constipation (dependent upon the inability of the abdominal muscles to assist defecation), the patients are said to have died of " extreme exhaustion." In 48 cases the patients died from causes immediately associated with labours rendered difficult by deformities produced by the disease. In 33 of these cases Cæsarean section was performed. Different expedients were resorted to in other cases to accomplish delivery.

Among the cases in which recovery is stated to have taken place there are, perhaps, none more striking than two recorded by Beylard.[2] Both these cases came under the care of M. Trousseau. In each the progress of the malady was well marked. Each recovered health under the combined influences of rest, warmth, good food, and cod-liver oil; although, of course, the striking and characteristic deformities remained.

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[1] 'Edinburgh Medico-Chirurg. Trans.,' vol. ii, p. 136.
[2] Op. cit, pp. 266—274.

In both, the pelvis and the spine were the parts most strikingly affected. In one, the femora also became deformed.

There does not appear to be any reason to doubt the possibility of cure in such cases. As long as the walls of the thorax are sufficiently firm for the purposes of respiration, and the bones of the spinal column are prevented from injuring the most vital parts of the cord—as long also as the patient is free from the dangers of an unnaturally complicated labour—it is difficult to understand how any mere softening of the bones can lead to a fatal result. And as far as the general processes of nutrition are concerned, however they may have become perverted, and whatever special expression, as it were, their perversion may have assumed, we know of no reason why they should not be induced to return to their normal course, provided only that time be given by the warding off of death, and favorable conditions be supplied. The favorable conditions manifestly required in the treatment of mollities ossium—as, indeed, in the treatment of almost all other chronic perversions of the nutritive processes—are mental ease, bodily rest, good food, good air, warmth, with such medicaments as cod-liver oil, iron, and quinine.

In the treatment of rickets it is by no means impossible that the administration of lime-salts may be of service; but in mollities ossium there are already more lime-salts in the body than can be retained, and to give more only throws additional work upon the excreting organs.

Granting, then, that mollities ossium is not an absolutely incurable malady, the questions naturally arise, how does the process of cure affect the softened bones? in what way does it become manifest? what changes in appearance and structure ensue? and what are the final results? The bones I have been examining seem to me clearly to indicate the direction in which the answers to these and such like questions are to be sought. But, before entering into particulars on these points, I would very briefly direct attention to some of the more general features of certain other abnormal conditions of the bones, which I proposed to myself to discuss in the present paper more fully than I now find my limits will permit.

Scattered through the pathological collections in different
museums are to be found a number of bones, principally
skulls, which are thickened to a very remarkable extent, and
so altered in texture and composition as to present a most
curious general appearance.   Such bones appear almost uni-
versally to have been met with accidentally.   Some have been
found in churchyards, some in dissecting-rooms; in no
instance, as far as I have been able to ascertain, is there any
satisfactory history on record of any case in which this pecu-
liar condition has been found after death,—much less has
it ever been diagnosed during life.   In some instances a few
particulars only, of very little value, have been made out by
careful inquiry after the accidental discovery of the abnormal
conditions of the bones.   In the great majority of these in-
stances the patients appear to have been insane, or, at any rate,
of weak intellect.   Such was the case with two of the subjects,
portions of whose skulls are preserved in the Guy's Hospital
museum.   Such also was the case with two other subjects,
whose remains are represented by sundry specimens in the
museum of St. Thomas's Hospital.

The bones alluded to are all of them very much thickened,
and in some instances to an enormous extent.   In the skulls
the sutures are obliterated, the diploe more or less completely
absent, and the grooves and foramina for the blood-vessels very
greatly increased in size and number.   But beyond these
points of general resemblance we find that these bones may be
easily arranged in an apparently natural consecutive series, or
rather, as I think I shall hereafter be able to show, in two such
consecutive series.   In the first of these series the bones are
more or less uniform in structure.   They are comparatively
spongy, light, and somewhat disposed to crumble under
pressure.   Their general appearance has not inaptly been
compared to that of dried mortar.   All such conditions may
properly be included under the name of porous hyperostosis.
In the second of these series the bones are extremely hard,
dense, and heavy, but, like those of the first series, they have a
certain rough irregularity of texture.   The several varieties of

this series may be included under the generic term sclerotic
hyperostosis.   Both series, or rather certain members of both
series, are represented in the museum of Guy's Hospital.
The skull, a portion of which is shown in Pl. III, fig. 1,
drawn to the natural dimensions, may be regarded as typically
illustrating the first series.   And that from which fig. 2
in the same place is taken affords, I think, a fair example of
the second series.   Now, it is, I believe, generally considered
by the few who have paid any attention to this subject, that
the dense heavy condition is related by succession to the light
porous condition, and that the transformation is effected by a
process of what has been termed "consecutive induration"
(Rokitansky).   It seems to me, however, after the most careful
examination, that it is probable, rather, that, although processes
of "consecutive induration" unquestionably go on in each,
yet nevertheless the two series are really distinct, and represent
the more or less perfectly cured conditions of different diseases.
The soft mortar-like series illustrates, I believe, the changes
which ensue when the progress of mollities ossium has been
arrested, and a more or less successful attempt at repair and
the re-establishment of normal nutrition has been set up.   The
dense and hard series, on the other hand, similarly illustrates, I
believe, the cure of rickets under certain particular circum-
stances and conditions.   Into the full discussion of these pro-
positions, however, space does not permit me at present to
enter, but I propose to return to the subject in a future num-
ber, and adduce satisfactory evidence in support of what I have
here suggested.

With regard to the transition of bones softened by mollities
into the porous form of hyperostosis, the evidence seems to me
very strong, and may briefly be stated as follows.   In mollities
the bones become, as we have seen, distended and sponge-like
in their general structure.   In the skull the diploe disappears,
and the tables become thickened ; the sutures are more or less
obliterated, and the grooves for the blood-vessels enlarge.   All
these alterations remain, and some of them become more pro-
nounced in porous hyperostosis.   Indeed, if a portion of skull
affected with mollities be slightly macerated and dried, and
then compared with a similar portion from a skull affected
with porous hyperostosis, a very striking general similarity in

appearance is at once seen to exist between the two. It seems, to the unaided eye, as though the mollities-bone did but want the addition of a little more earthy matter and a little more general firmness and resistancy to make it exactly resemble the other. And on examining certain portions of the respective bones under the microscrope the resemblance is still further illustrated. In Plate IV, fig. 6, a very accurate representation is given of the appearance presented under a low power by a section taken from the skull affected with porous hyperostosis figured in Plate III, fig. 1; and by its side (Plate IV, fig. 7) is an equally accurate representation of a section taken from the hard spot in the skull affected by mollities, the situation of which is indicated by *a* in Plate II, fig. 3. It is needless to describe in words the points of resemblance between these two specimens; they are very obviously, as well as very faithfully, shown by the drawings referred to, and still more strikingly illustrated by, fig. 5, Plate IV. This figure represents a small portion of the porotic bone more highly magnified; it is drawn to the same scale as figs. 3 and 4 on the same plate. A comparison of these figures shows at once how closely in general arrangement, shape, and size, the lacunæ (or bone-corpuscles) and canaliculi of the porotic bone resemble those of the bone affected with mollities, and in what precisely similar respects in both cases these structures differ from the corresponding ones of healthy bone.

It seems impossible to resist the conclusion that at the point indicated by *a* (fig. 3, Plate II), and at several other like spots in the different parts of the bone, a process of repair had actually commenced, which, had the life of the patient been prolonged, might have extended throughout the whole softened bone. Further, that if such a result had happily occurred there would have been brought about a condition of skull more or less closely resembling that which we have been speaking of as porous hyperostosis. That the spots alluded to indicate the presence of a process of repair, and are not mere portions of hitherto unaffected bone, is rendered evident, not only by their microscopical appearance, but by their position. They are, as far as I have seen them, in every instance, in parts of the bones which ought to be occupied by diploe, and where, therefore, no such dense spots would be found in normal bones.

Description of the Plates illustrating Mr. Durham's paper on Certain Abnormal Conditions of the Bones.

PLATE I

Represents the habitual position of the lower part of the body of Sarah W—— (the subject of Case 1) during the greater part of her stay in Guy's Hospital.

PLATE II.

Fig. 1. Shows a section through the outer, fig. 2 through the inner, condyle of the left femur, and corresponding portion of the head of the tibia. The thinness of the articular cartilage is shown especially in fig. 1, in which also the fusion of one of the semilunar cartilages with the articular cartilage is represented. In—

Fig. 2 is shown the commencement of a fibrous anchylosis between the femur and tibia.

Fig. 3. Shows somewhat diagrammatically the exact thickness of a portion of the frontal bone. The entire absence of diploe is indicated. The somewhat circular spot indicated by *a* was remarkably hard as compared with the rest of the bone; the spot indicated by *b* as remarkably soft.

Fig. 4. A section of the upper part of the humerus.

Fig. 5. A section of two of the dorsal vertebræ.

All these figures are drawn to the natural dimensions, from bones from the body of Sarah W——.

PLATE III.

Fig. 1. From a portion of skull to be placed in the museum of Guy's Hospital, to illustrate the appearances presented in porous hyperostosis cranii.

Fig. 2. From a portion of a skull in the museum of Guy's Hospital, to illustrate the appearances presented in sclerotic hyperostosis cranii.

PLATE IV.

Fig. 1. Section of normal occipital bone.

Fig. 2. Section of occipital bone affected with mollities, cut from the same part and in the same direction as the above, and drawn to exactly the same scale.

Fig. 3. Another portion of the specimen from which fig. 2 was taken, very much more highly magnified. The alterations in the size, shape, and general arrangement of the lacunæ and canaliculi, characteristic of mollities, are well shown, especially when the figure is compared with—

Fig. 4, which represents a small portion of normal bone from the corresponding part of a healthy skull.

Fig. 5. Represents the appearance presented by a portion of the skull affected with porous hyperostosis (figured in Plate III, fig. 1), magnified to precisely the same extent as figs. 3 and 4.

Fig. 6. A larger portion of a section from the frontal bone of the same skull (porous hyperostosis), magnified to a considerably less extent, for comparison with

Fig. 7, which represents a corresponding section from the spot *a*, in the frontal bone of the skull affected with mollities. See Plate II, fig. 3.

Figures 1, 2, 6 and 7, were traced on the stone from photomicrographs taken by myself.

Figures 3, 4 and 5, were traced from sketches made by aid of the camera lucida.

The exact scale has thus been preserved in all instances.

All the figures were most minutely finished from the objects themselves, under the microscope, by Mr. Tupper, who has faithfully copied, not only the lacunæ, but even the individual canaliculi.

Plate 1.

W. Hurst, ad nat delin.

M & N. Hanhart, Imp[1]

Fig 2.

Fig.1

384²

Fig 3

a.

b.

Fig. 4.

Fig.5

M & N Hanhart lith.

Plate 3.

364³

Fig. 1.

Fig 2.

M & N Hanhart imp

Plate 4.
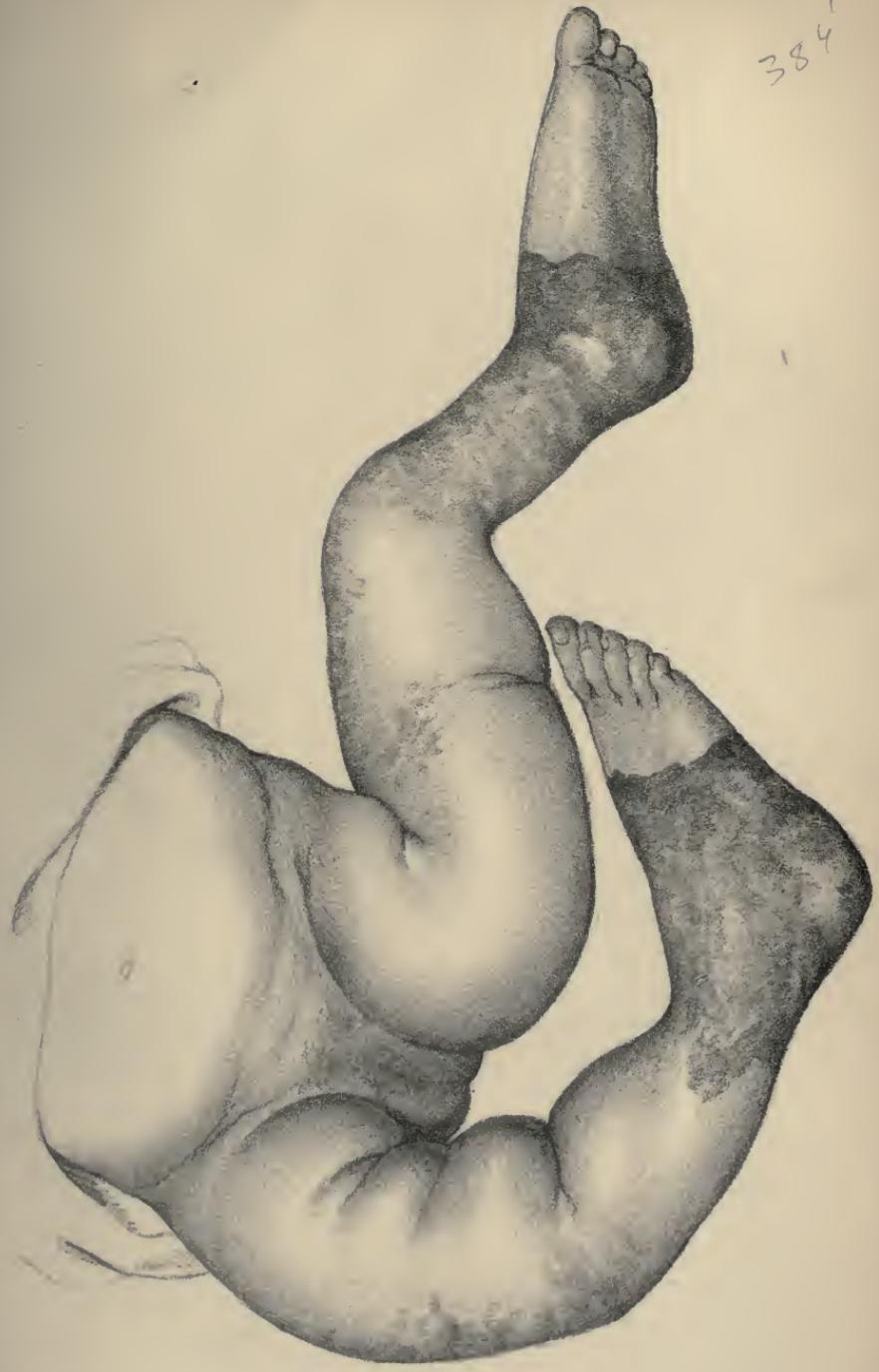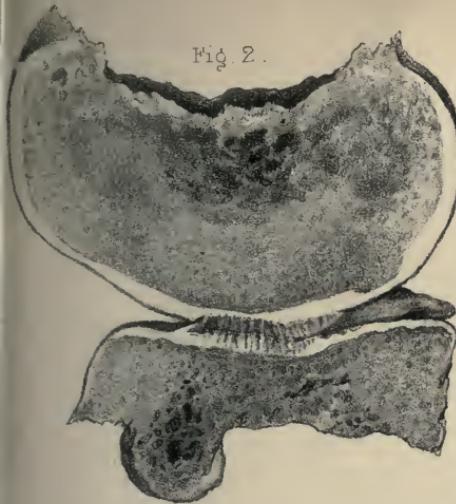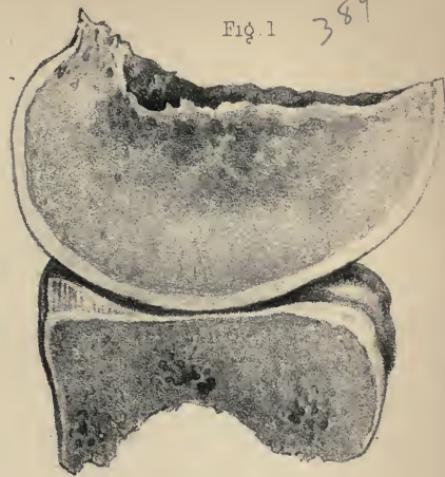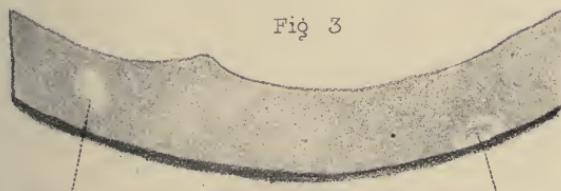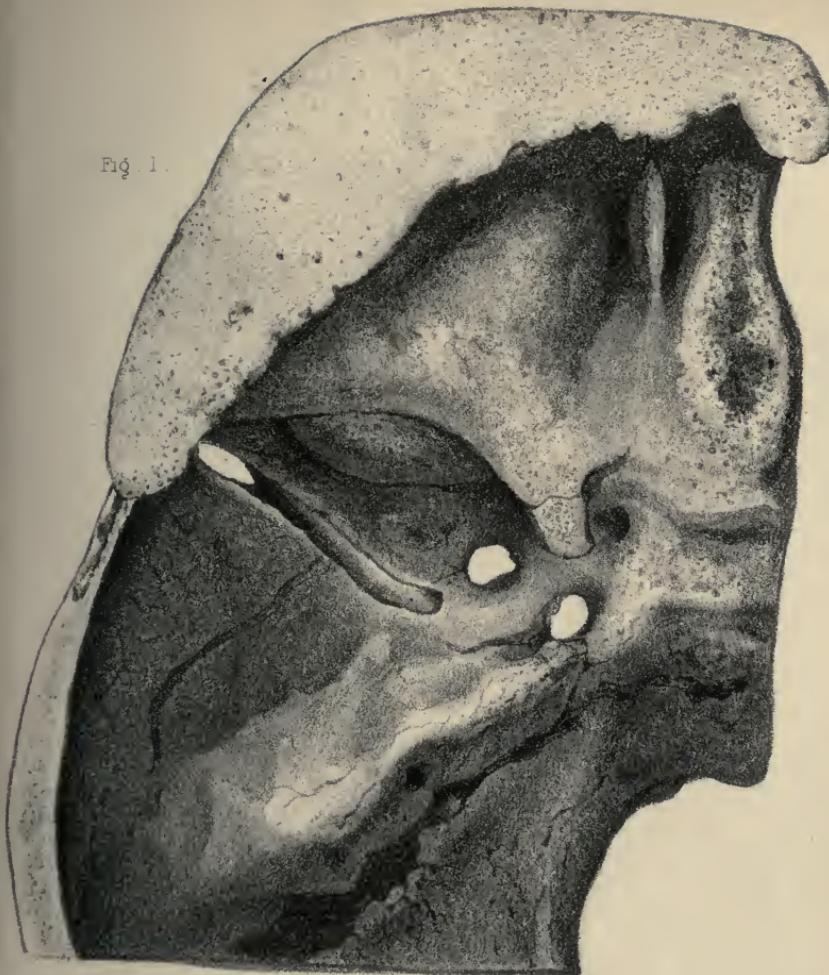
Fig. 1.

Fig. 2.

384
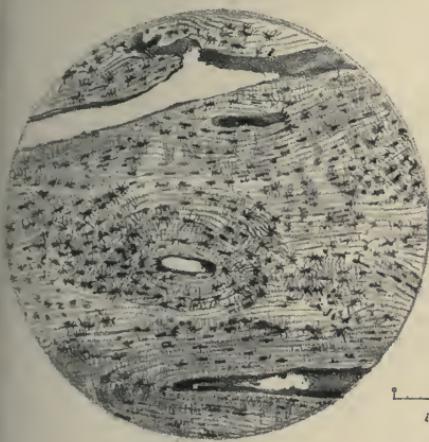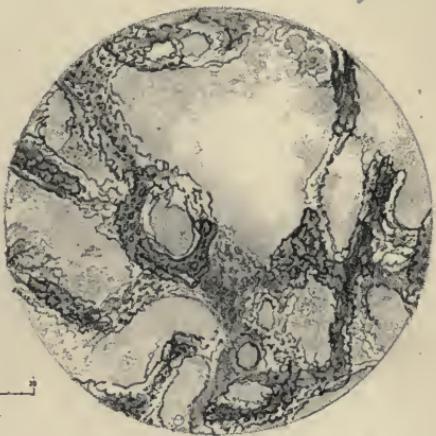
Fig. 3.
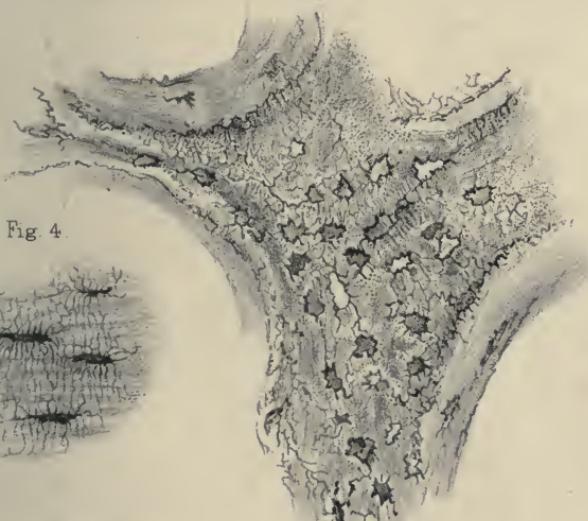
Fig. 4.

Fig. 5.
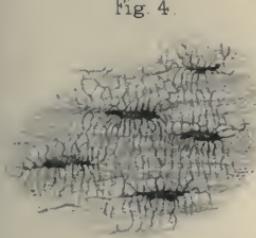
Fig. 6.
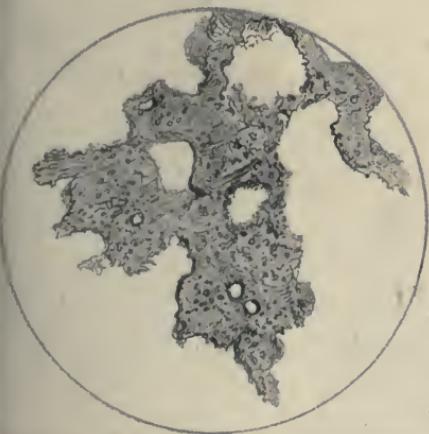
Fig. 7.

1000ᵗʰ of Inch.
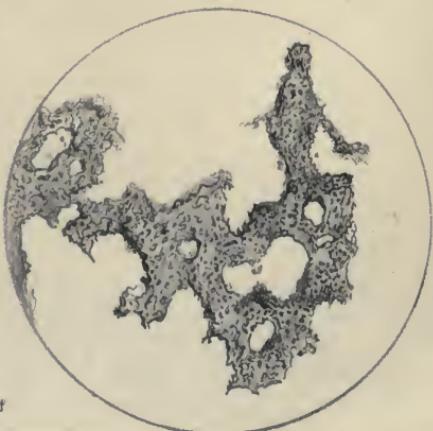
10,000ᵗʰ of Inch.

1000ᵗʰ of Inch.
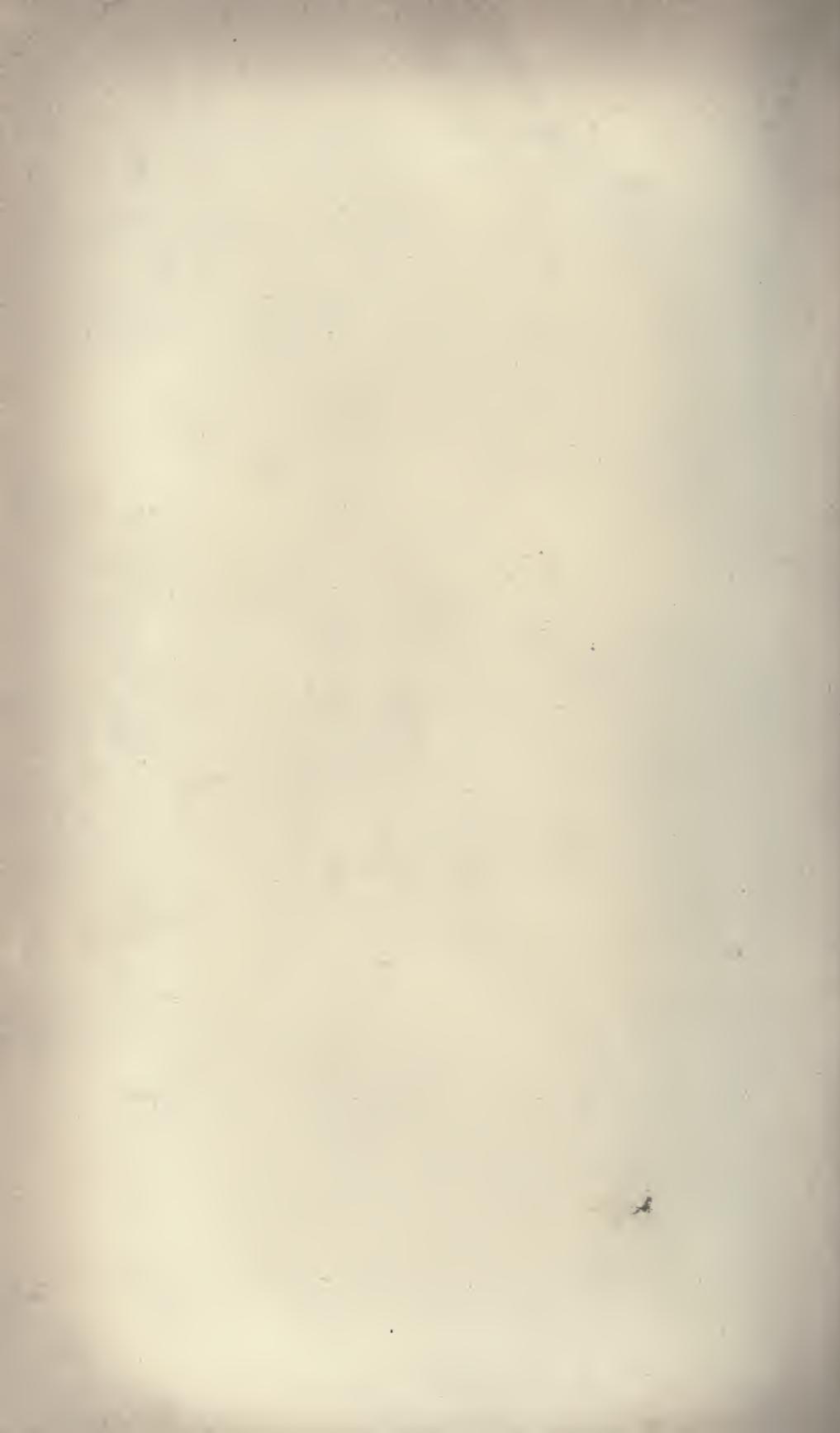
LIST

OF

GENTLEMEN EDUCATED AT GUY'S HOSPITAL,

WHO HAVE PASSED THE

EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,

&c. &c.

𝔘niversity of 𝔏ondon.

SECOND EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.
First Division.

*James Beddard.	‡Julius St. Thos. Clarke.
†Philip H. Pye Smith.	§Thomas Stevenson.

FIRST EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

ENTIRE.

First Division.

‖Stephen Wootten Bushell.	¶Henry Greenway Howse.

* Scholarship and Gold Medal for Surgery. First Class Honours in Medicine and Midwifery. Honours in Forensic Medicine.

† Gold Medals for Surgery and Medicine. First Class Honours in Midwifery. Honours in Forensic Medicine.

‡ First Class Honours in Forensic Medicine. Honours in Surgery, Midwifery, and Medicine.

§ Scholarship and Gold Medal for Forensic Medicine. Scholarship and Gold Medal for Midwifery. First Class Honours in Medicine and Surgery.

‖ Exhibition and Gold Medal for Organic Chemistry, Materia Medica, and Pharmaceutical Chemistry.

¶ Exhibition and Gold Medal for Physiology, Histology, and Comparative Anatomy. Honours in Anatomy.

Second Division.

John Augustus Ball.
Arthur Taylor.

George Eastes.
Thomas P. Warren.

PHYSIOLOGY ONLY.

First Division.

Henry Charles Hilliard.
Ebenezer Fulham Turner.

Arthur George Mickley.

Second Division.

W. Hugh Aldersey.

PRELIMINARY SCIENTIFIC EXAMINATION.

First Division.

J. Priestnall Cheetham.
W. Betts Giles.
G. Rolph Raine.

Henry Morris.
Frederick Taylor.

Second Division.

Herbert G. Budd.
Walter Green.
James Reginald Stocker.

William R. Cortis.
George Rootes.

University of Cambridge.

EXAMINATION FOR DEGREE OF MASTER IN SURGERY.

Alfred Garrett Platt Wilks, M.A., M.B.

Royal Colleges of Physicians and Surgeons (Edinburgh).

FIRST EXAMINATION.

James Milward.

Royal College of Physicians of London.

EXAMINATION FOR MEMBERSHIP.

Charles Hilton Fagge, M.D.

EXAMINATION FOR LICENTIATESHIP.

Frederick Thomas Hindle.
Henry Brietzcke.
Arthur George Mickley.

Josiah Court.
Thomas Heywood Smith.
William Clunie Wise, M.D.

FIRST EXAMINATION FOR LICENTIATESHIP.

Robert W. S. Barraclough.
Henry Charles Hilliard.
Alfred Edward Wilmot.
James William Smith.
Thomas Collier.
Josiah Court.

Fred. W. Humphreys.
John G. F. Wilford.
S. Wootten Bushell.
Henry Denne.
John Gill.
George W. Malim.

Royal College of Surgeons.

FELLOW BY EXAMINATION.

June, 1864.

James Beddard.

MEMBERS BY EXAMINATION.

November, 1863.

John Thompson Dickson.
Henry Skey Muir.
Montague Fred. Evershed.
Fred. Chas. Mudd.
Edward Reynolds Ray.

George Wall.
Frederick McNair.
Cleveland Smith.
Charles James Trennery.
Henry Vipan.

January, 1864.

George Eastes.
Samuel Forest Leach.

Wm. Cubitt Lucey.
John Jones Phillips.

April.

Robert Chapman Gibson.
Nynian Holman Lower.
Thos. Haywood Smith.
Henry Viant.
Charles Fred. Long.
John William Hayward.

Edward Peter Shorland.
John Sidney Turner.
Henry Couling.
Thos. Robert Nason.
Henry Octavius Steele.
Thos. Henry Knott.

May.

Henry T. Broughton.
Edwin Burrell.
Robert Charles Earle.
Thos. E. Hayes.
George Paddon.
Andrew Wise.

Herbert B. Spurgin.
Joseph W. Barrett.
Joseph Johnson.
Frederick Manser.
Augustin B. Fry.
William Melville Knipe.

JULY.

Charles Edward Blair.
Thos. Collier.
Richard Rothwell Daglish.
George H. Hills.
John Caryton Roberts.
George Henry Savage.

Ernest Last Fyson.
Ebenezer F. Turner.
Alfred Edward Wilmott.
W. T. H. Wood.
Francis Thos. Tayler.
Richard Talbot.

Licentiates in Midwifery.

Henry Todd Broughton.
Wm. Cubitt Lucey.

Chauncy Puzey.
Henry Viant.

FIRST, OR ANATOMICAL AND PHYSIOLOGICAL EXAMINATION.

NOVEMBER, 1863.

Andrew Wise.

JANUARY, 1864.

R. C. Andrews.
T. E. D. Hayes.
G. H. Hills.
C. Broom.

C. E. Blair.
W. T. G. Hicks.
J. Caryton Roberts.
R. Orme.

·APRIL.

S. W. Bushell.
A. Ewen.
B. C. Gowing.
R. Stuart.
J. H. Walters.
Joseph Batteson.
H. S. Taylor.
W. M. Knipe.
H. G. Budd.
Herbert Lucas.
Joseph Riley.
G. J. B. Stevens.
Alfred Harwood.
F. M. Rickard.
E. A. Trimnell.

Henry Morris.
W. H. Butler.
J. Gill.
R. B. Nowell.
J. Thomas.
H. Weekes.
Henry Denne.
G. R. Raine.
James Haslam.
J. S. S. Perkins.
Clement Palmer.
H. C. Smith.
Henry Whiting.
H. D. Reynolds.
Thornton G. Simpson.

MAY.

George Birch.
E. A. Fluder.
Francis Lett.
Osmer King.
H. H. Braye.

J. H. Croft.
A. B. Fry.
G. J. Muriel.
F. B. Lardner.

July.

W. H. Pywell.
R. R. S. C. C. Lloyd.
Alderson Newsam.

J. D. Rowlands.
W. J. Marsh.

Licentiates of the Apothecaries' Society.

October, 1863.

Arthur Evershed.
Montague F. Evershed.

Chas. Fred. Knight.
Joseph Smith.

November.

James Beddard.
Thos. Hollyoake.

George Starling.
Wm. Milward Seabrook.

January, 1864.

Henry Mackenzie Parkes.

Fred. McNair.

February.

Henry Osborn Butcher.

May.

Thos. Henry Knott.
Robert Chapman Gibson.

John Arthur Ensor.

June.

Henry Viant.
Henry Todd Broughton.
Henry Dawson.

Chauncy Puzey.
Thos. Haywood Smith.
Augustin Barber.

July.

Roderick W. Henderson.
William Melville Knipe.

William Cubitt Lucey.
John Sidney Turner.

August.

Wm. Parsons Knott.
Nynian Holman Lower.
Frederick Lawton.

Edward Reynolds Ray.
Charles White.
Joseph W. Barrett.

September.

J. W. Hayward.

FIRST EXAMINATION.

October.

Robert W. S. Barraclough.

Roderick Wm. Henderson.

November.

Ernest Last Fyson.
George Rendle.
Thos. Collier.

Robert Charles Earle.
Nynian H. Lower.

December.

Henry Richard Smith.
Joseph Wm. Barrett.

John G. F. Wilford.
Richard Rothwell Daglish.

April.

George W. Malim.
Thomas Franklin Lloyd.

Richard J. Andrews.

June.

Henry Denne.
Algernon Ewen.
John S. S. Perkins.
Richard B. Nowell.

Henry Weekes.
F. E. Manby.
George B. Stevens.

July.
W. J. Marsh.

August.

George Fowler.
Herbert Lucas.

Edward Alfred Trimnell.
William Harris Butler.

Apothecaries' Hall.

SILVER MEDAL AND BOOKS FOR BOTANY.

G. R. Raine.

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1863-4.

EXAMINATION OF STUDENTS IN MEDICINE AND ITS ALLIED SCIENCES, August 3rd, 1864.

THIRD YEAR'S STUDENTS.

George Henry Savage, Brighton, the Treasurer's Gold Medal for Clinical Medicine.
James Milward, Bristol, the Treasurer's Gold Medal for Surgery.
Henry Greenway Howse, Reading, first Prize, £40.
James Milward, second Prize, £35.
George Henry Savage, Honorary Certificate.

SECOND YEAR'S STUDENTS.

Henry Denne, Sandwich, first Prize, £35.
John Gill, Weston, Hawkstone, Shrewsbury, second Prize, £30.
Henry S. Taylor, Alton, Hants, Honorary Certificate.

FIRST YEAR'S STUDENTS.

Benjamin Neale Dalton, South Lambeth, first Prize, £30.
William Betts Giles, Bonchurch, Isle of Wight, second Prize, £25.
William Johns, Haverford West, third Prize, £10 10s. (presented by one of the Governors).
Richard Clement Lucas, Petersfield, Sussex, Honorary Certificate.
Arthur Bowes Elliott, Richmond, Yorkshire, Honorary Certificate.
William Spratt, Tottenham, Honorary Certificate.
Samuel John Truman, Nottingham, Honorary Certificate.
Arthur Claude Taylor, Nottingham, Honorary Certificate.
Samuel Key Watson, Jersey, Honorary Certificate.

ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, &c., OCTOBER, 1863.

William Betts Giles, first Prize, £25.
Frederick Taylor, Kennington, second Prize, £20.
George Rootes, Ross, Herefordshire, Honorary Certificate.
Arthur Bowes Elliott, Honorary Certificate.
Matthew Owen Coleman, Kingston, Honorary Certificate.

PUPILS' PHYSICAL SOCIETY.

PRIZE FOR BEST ESSAY READ BEFORE THE SOCIETY.

First.

James Milward.

Second.

Marmaduke Mayou, } Equal.
Henry Couling,

HONORARY CERTIFICATES FOR 100 CASES OF MIDWIFERY.

G. Fowler.
H. G. Moore.
F. W. Fowke

R. Harris.
T. Brockwell.
E. J. Fairland.

GENTLEMEN WHO HAVE HELD HOSPITAL APPOINTMENTS
SINCE OCTOBER, 1863.

HOUSE-SURGEONS.

William L. Cass.
Edward Whitfield Thurston.
Frederick Long.

Alfred G. Platt Wilks.
Walter Beeby.
J. Sidney Turner.

DRESSERS TO THE SURGEONS.

Henry Brietzcke.
J. Sidney Turner.
John J. Phillips.
A. G. Mickley.
Chauncy Puzey.
T. T. Bridgman.
W. H. Vipan.
O. T. Duke.
G. H. Hills.
F. Sutton.
J. Milward.
F. Manser.
H. B. Spurgin.

H. J. Dwelly.
G. Paddon.
J. W. Hayward.
H. Couling.
H. C. Hilliard.
Edwin Burrell.
N. H. Lower.
F. W. Humphreys.
H. T. Broughton.
C. Smith.
E. C. Roberts.
F. Wilford.

DRESSERS IN THE OPHTHALMIC WARD.

W. H. Vipan.
G. Eastes.
Edwin Burrell.
R. Gore.
E. R. Ray.
Arthur Taylor.

F. Lawton.
J. W. Barrett.
J. A. Ensor.
Chauncy Puzey.
J. Milward.
J. S. S. Perkins.

DRESSERS TO THE ASSISTANT-SURGEONS.

O. T. Duke.
A. Taylor.
Ed. Shorland.
J. W. Barrett.
J. Milward.
J. W. Hayward.
G. Paddon.
H. Viant.
Charles Smith.
H. O. Steele.

T. R. Nason.
N. H. Lower.
G. H. Savage.
R. C. Gibson.
C. F. Long.
S. W. Bushell.
M. Mayou.
H. C. Hilliard.
R. W. Barraclough.
G. Rendle.

F. W. Humphreys.
R. J. Andrews.
H. R. Smith.
G. F. E. Wilkinson.
W. T. H. Wood.
T. Collier.
A. Charlton.
H. Broom.
E. T. Green.
W. M. Knipe.
W. M. Butler.

A. C. Jackson.
A. E. Wilmot.
J. Batteson.
H. Dawson.
A. B. Fry.
E. F. Turner.
R. B. Nowell.
F. T. Tayler.
H. Weekes.
T. G. Simpson.
G. G. Bott.

CLINICAL CLERKS.

Winter Session, 1863-64.

C. White.
M. F. Evershed.
F. Sutton.
G. H. Hills.
H. Couling.
H. B. Spurgin.
R. C. Gibson.

G. Eastes.
J. W. Hayward.
E. Shorland.
G. Paddon.
F. Lawton.
J. A. Ensor.

Summer Session, 1864.

W. C. Lucey.
Chauncy Puzey.
J. Makins.

G. H. Savage.
E. C. Roberts.
H. T. Broughton.

POST-MORTEM CLERKS.

G. H. Savage.
J. A. Ball.
T. Collier.
J. A. Ensor.
J. Batteson.
A. C. Jackson.

J. S. S. Perkins.
A. B. Fry.
A. Ewen.
R. J. Andrews.
H. Lucas.

SENIOR RESIDENT OBSTETRIC CLERKS.

1863.	September	.	.	.	.	Chauncy Puzey.
	October	.	.	.	.	J. Chaundy Clarke.
	November	.	.	.	.	E. Whitfield Thurston.
	December	.	.	.	.	Frederick Long.
1864.	January	.	.	.	.	Edward R. Ray.
	February	.	.	.	.	Harry G. Moore.
	March .	.	.	.	.	Walter Beeby.
	April .	.	.	.	.	Montague F. Evershed.
	May .	.	.	.	.	John J. Phillips.
	June .	.	.	.	.	J. Sidney Turner.
	July .	.	.	.	.	Henry R. Smith.
	August .	.	.	.	.	Herbert B. Spurgin.

DENTAL SURGEONS' DRESSERS.

E. C. Roberts.
H. C. Hilliard.
J. G. T. Wilford.
R. C. Earle.
A. G. Mickley.
H. Brietzcke.

A. G. Medwin.
J. Milward.
H. B. Spurgin.
Cecil Smith.
E. Burrell.
H. Couling.

DRESSERS IN THE SURGERY.

H. Couling.
H. C. Hilliard.
R. C. Gibson.
M. J. Mayou.
G. H. Savage.
J. A. Ensor.
F. T. Tayler.
E. F. Turner.

R. W. J. Barraclough.
Charles Smith.
A. E. Wilmott.
Thomas Collier.
Alfred Charlton.
A. C. Jackson.
G. Eastes.
John Batteson.

NUMBER OF CASES OF LABOUR ATTENDED DURING ONE YEAR.

1863.	September	.	.	.	.	.	155
	October .	.	.	.	.	.	154
	November	.	.	.	.	.	131
	December	.	.	.	.	.	120
1864.	January .	.	.	.	.	.	161
	February .	.	.	.	.	.	143
	March .	.	.	.	.	.	150
	April	.	.	.	.	.	146
	May	.	.	.	.	.	144
	June	.	.	.	.	.	122
	July	.	.	.	.	.	82
	August	.	.	.	.	.	135

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GUY'S HOSPITAL.

1864-65.

THE MEDICAL SESSION

COMMENCES ON THE FIRST OF OCTOBER.

The Introductory Address will be given by JOHN BRAXTON HICKS, M.D., F.R.S., on Saturday, the First of October, at Two o'clock.

Gentlemen desirous of becoming Students must produce satisfactory testimony as to their Education and Conduct.

Fee for Hospital Practice and Lectures :—First year, £40 ; second year, £40 ; and £10 for every succeeding year of attendance. One payment of £100 entitles a Student to a perpetual Ticket. The expenses for material in practical courses are extra.

Clinical Clerks, Dressers, Ward Clerks, Dressers'-Reporters, Obstetric Residents, and Dressers in the Eye-Wards, are selected according to merit from those Students who have attended a second year. Each Dresser (except those in the Eye-Wards) has the privilege of rooms and commons in the Hospital free of charge for one month of his course. The Obstetric Residents have the like privilege for two months each—one month as junior, another as senior. A Resident House-Surgeon is appointed every three months from those Students who have obtained the College Diploma.

The Students are required to conform to the Rules and Regulations for the internal management of the Hospital.

The privileges of a Student will be withdrawn in the event of neglect or misconduct.

Certificates will not be given for Lectures or Practice, unless duly attended.

The Winter Session terminates March 31st.

The Summer Session commences May 1st, and concludes July 31st.

VOLUNTARY EXAMINATIONS

ARE HELD AT FOUR PERIODS OF THE STUDENT'S COURSE, AS FOLLOWS :

FIRST.—At Entrance ; and will take place this year on Monday, October 10th. It will comprise Elementary Classics, Ancient and Modern History, and Mathematics. The Candidate who shall distinguish himself the most, will receive £25 ; the second Candidate, £20 ; and the third, £15.

SECOND.—At the end of July in the first year, on all the Subjects of the first year's Course of Study, one sum of £30, another of £25,

and a third of £10 10s. (presented by one of the Governors) will be given according to proficiency.

THIRD.—At the end of July in the second year, on the Subjects which form the Course of Study up to that time, £35 and £30.

FOURTH.—At the end of July in the third year, on all the Subjects of the Curriculum, £40 and £35.

No Prize will be awarded unless the Candidates possess sufficient merit.

HONORARY CERTIFICATES will be given to those Candidates who pass a creditable Examination.

SPECIAL EXAMINATION.

TWO GOLD MEDALS are given annually by the Treasurer to Student, at the end of their third year : one for Clinical Medicine, and the other for Clinical Surgery.

SINGLE COURSES OF LECTURES

MAY BE ATTENDED ON THE FOLLOWING TERMS:

Anatomy, Physiology, Demonstrations and Dissections, Medicine Surgery, Chemistry, Midwifery, on the payment of Five Guineas for each Course of Lectures.

Materia Medica, Medical Jurisprudence, Botany, Practical Chemistry, Comparative Anatomy, on the payment of Four Guineas for each Course.

Fee for Attendance on either the Medical or Surgical Practice of the Hospital :—Three Months, Ten Guineas ; Six Months, Fifteen Guineas ; Twelve Months or Perpetual, Twenty-five Guineas.

Several of the Lecturers have vacancies for private pupils.

MEDICAL OFFICERS.

Physicians.—G. H. BARLOW, M.D. ; OWEN REES, M.D., F.R.S. ; W. W. GULL, M.D.

Assistant Physicians.—S. O. HABERSHON, M.D. ; S. WILKS, M.D. ; F. W. PAVY, M.D., F.R.S.

Surgeons.—EDWARD COCK, Esq. ; J. HILTON, Esq., F.R.S. ; J. BIRKETT, Esq. ; A. POLAND, Esq.

Assistant Surgeons.—J. COOPER FORSTER, Esq. ; THOMAS BRYANT, Esq. ; ARTHUR DURHAM, Esq.

Obstetric Physician.—HENRY OLDHAM, M.D.

Assistant Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Surgeon-Dentist.—J. SALTER, Esq., F.R.S.
Surgeon-Aurist.—JAMES HINTON, Esq.
Eye Infirmary.—*Consulting Surgeon*, JOHN F. FRANCE, Esq.
          Surgeon.—A. POLAND, Esq.
          Assistant Surgeon.—C. BADER, Esq.
Apothecary.—JAMES STOCKER, Esq.

LECTURES, &c.

WINTER COURSES.

Medicine.—DR. OWEN REES and DR. GULL, Mondays, Wednesdays, and Fridays, at half-past three.

Clinical Medicine.—DR. BARLOW, DR. OWEN REES, and DR. GULL.

Surgery.—MR. BIRKETT, and MR. POLAND, Tuesdays, Thursdays, and Saturdays.

Clinical Surgery.—MR. COCK, MR. HILTON, MR. BIRKETT, and MR. POLAND.

Anatomy, Descriptive and Surgical.—MR. COOPER FORSTER, and MR. DURHAM, Tuesdays, Wednesdays, Thursdays, and Fridays, at nine.

Physiology and Microscopic Anatomy. — DR. PAVY, Tuesdays, Thursdays, and Saturdays, at half-past twelve.

Demonstrations on Anatomy.—Principal Demonstrator—WALTER MOXON, M.B. Demonstrators—MR. BANKART and DR. C. HILTON FAGGE, daily.

Demonstrations on Morbid Anatomy.— DR. WILKS, daily, at half-past two.

Clinical Lectures on Midwifery and Diseases of Women. — DR. OLDHAM and DR. HICKS.

Chemistry.—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at eleven.

Experimental Philosophy.—DR. C. HILTON FAGGE, Fridays, at twelve.

Lying-in Charity.—DR. OLDHAM and DR. J. BRAXTON HICKS.

Curator of the Museum.—DR. WILKS.

SUMMER COURSES.

Demonstrations on Cutaneous Diseases. — DR. HABERSHON, Mondays, at one.

Materia Medica.—DR. HABERSHON, Tuesdays, Thursdays, and Saturdays, at three.

Clinical Medicine.—DR. HABERSHON, DR. WILKS, and DR. PAVY.

Clinical Surgery.—MR. COOPER FORSTER, MR. BRYANT, and MR. DURHAM.

Midwifery. — DR. OLDHAM and DR. BRAXTON HICKS, Tuesdays, Wednesdays, Thursdays, and Fridays, at a quarter to nine.

Medical Jurisprudence.—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at ten.

Ophthalmic Surgery.—Mr. POLAND and Mr. BADER, Mondays, at a quarter to nine.

Pathology.—Dr. WILKS, Saturdays, at a quarter to nine.

Dental Surgery.—Mr. SALTER.

Comparative Anatomy and Zoology.—Dr. PAVY and Dr. MOXON, Tuesdays and Saturdays, at half-past twelve.

Use of the Microscope.—Mr. DURHAM, Mondays, at half-past twelve.

Botany.—Mr. JOHNSON, Tuesdays, Thursdays, and Saturdays, at half-past eleven.

Practical Chemistry.—Dr. STEVENSON, Mondays, Wednesdays, and Fridays, ten to one.

Demonstrations on Operative and Manipulative Surgery. — Mr. BRYANT, Mondays, at three.

Registrars.—Medical—Dr. MOXON ; *Surgical*—Mr. BANKART.

Dr. MOXON, Mr. BANKART, and Dr. HILTON FAGGE, will assist Pupils in their Studies.

THE LIBRARY, MUSEUMS, AND MODEL-ROOMS, ARE OPEN DAILY TO THE STUDENTS, FROM NINE O'CLOCK A.M. TILL FIVE O'CLOCK P.M.

Mr. STOCKER, *Apothecary to Guy's Hospital, is authorised to enter the Names of Students.*

ASTLEY COOPER PRIZE.

The Eighth Triennial Prize of Three Hundred Pounds,

Under the Will of the late SIR ASTLEY COOPER, Bart.,

WILL BE AWARDED TO

THE AUTHOR OF THE BEST ESSAY OR TREATISE

"ON INJURIES OF THE HEAD AND THEIR TREATMENT."

THE Condition annexed by the Testator is, "That the Essays or "Treatises written for such Prize shall contain original experiments "and observations, which shall not have been previously published, "and that such Essays or Treatises shall (as far as the subject shall "admit of) be illustrated by preparations and drawings, which pre- "parations and drawings shall be added to the Museum of Guy's "Hospital, and shall, together with the Work itself and the sole and "exclusive interest therein and the copyright thereof, become thence- "forth the property of the Hospital, and be transferred as such by "the successful candidate."

It is the will of the Founder that no Physician, or Surgeon, or other officer for the time being, of Guy's Hospital or of St. Thomas's Hospital, nor any person related by blood or affinity to any such Physician, or Surgeon, or other officer for the time being, shall at any time be entitled to claim the Prize; but, with the exception here referred to, this (the Astley Cooper) Prize is open for competition to the whole world.

Candidates are informed that their Essays, either written in the English language, or, if in a Foreign Language, accompanied by an English translation, must be sent to Guy's Hospital on or before January 1st, 1865, addressed to the Physicians and Surgeons of Guy's Hospital.

Each Essay or Treatise must be distinguished by a Motto, and be accompanied by a sealed envelope containing the Name and Address of the Writer. None of the envelopes will be opened, except that which accompanies the successful Treatise. The unsuccessful Essays or Treatises, with the illustrative preparations and drawings, will remain at the Museum of Guy's Hospital until claimed by the respective writers or their agents.

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TO

THE THIRD SERIES

OF THE

GUY'S HOSPITAL REPORTS,

INCLUDING

THE FIRST TEN VOLUMES

(1855—1864).

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